FURUNO

INSTALLATION MANUAL

DUAL-FREQUENCY SEARCHLIGHT SONAR

MODEL CH-300

FURUNO ELECTRIC CO., LTD.

www.furuno.co.jp

(Elemental Chlorine Free)

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⚠ SAFETY INSTRUCTIONS

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel should work inside the equipment.

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

Do not install the equipment where it may get wet from rain or water splash.

Water in the equipment can result in fire, electrical shock or damage to the equipment.

Be sure no water leaks in at the transducer installation site.

Water leakage can sink the vessel.
Also confirm that the transducer will not loosen by ship's vibration.
The installer of the equipment is solely responsible for the proper installation of the equipment. FURUNO will assume no responsibility for any damage associated with improper installation.

⚠ WARNING

Install the specified transducer tank in accordance with the installation instructions. If a different tank is to be installed the shipyard is solely responsible for its installation, and it should be installed so the tank doesn't strike an object.

The tank or hull may be damaged if the tank strikes an object.

If a steel tank is installed on a wooden or FRP vessel, take appropriate measures to prevent electrolytic corrosion.

Electrolytic corrosion can damage the hull.

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or damage to the equipment. The voltage rating of the equipment appears on the label above the power connector.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Observe the following compass safe distances to prevent deviation of a magnetic compass:

	Standard	Steering
CH-302/ MU-100C	0.80 m	0.55 m
CH-303	0.55 m	0.30 m
IF-8000	0.95 m	0.65 m
CH-302	0.30 m	0.30 m
CH-256	0.30 m	0.30 m

Install the monitor unit MU-100C out of direct sunlight.

It is difficult to see the display in direct sunlight.

Keep hands away from the raise/lower shaft of the hull unit when it is working.

Injury to hands may result if they become caught in the shaft.

Do not exceed 20 knots when operating the equipment and do not exceed 15 knots when raising or lowering the transducer.

The transducer shaft may become damaged.

The hull unit is designed to withstand ship's speed of 20 knots. For vessel with greater speed, reinforce the hull unit.

The transducer tank should be mounted at the place above the waterline. If this is impossible, make safety provisions (ex. construction of watertight compartment).

If there is a possibibility of vibration at the soundome in high-speed cruising, which creates prssure inside the tank, discuss the problem with shipyard and hull manufacturer.

⚠ CAUTION

WORKING WITH THE SONAROIL

Precautions
Keep oil away from eyes. Wear protective gloves when working with the oil. The oil can cause inflammation of the eyes.

Do not touch the oil. Wear protective gloves when working with the oil. The oil can cause inflammation of the skin.

Do not ingest the oil. Diarrhea or vomiting can result.

Keep the oil out of reach of children.

Emergency
If the oil enters eyes, flush with clean water about 15 min. Consult a physician.

If the oil contacts skin, wash within soap and water.

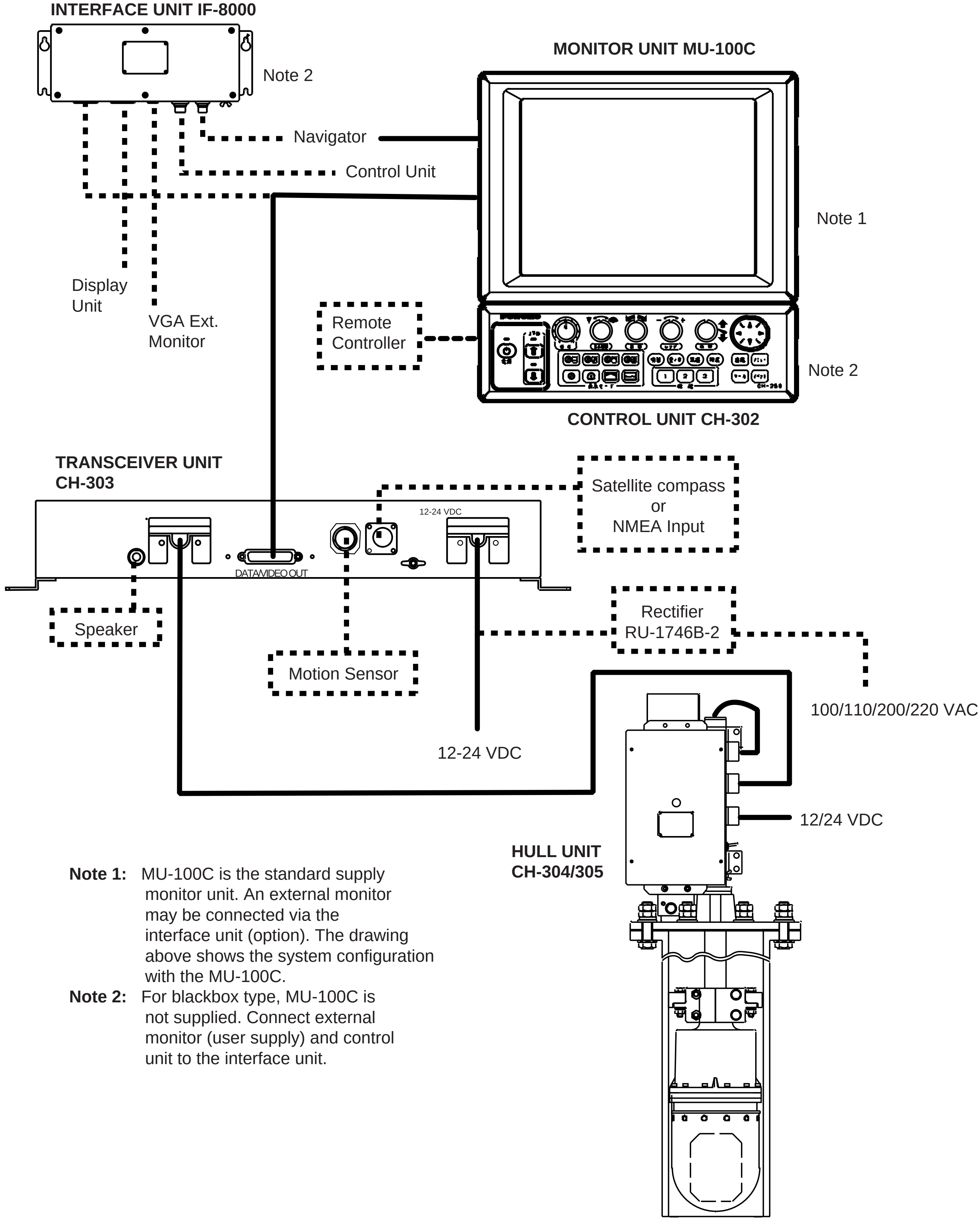
If the oil is ingested, see a physician immediately.

Disposal of oil and its container
Dispose of oil and its container in accordance with local regulations. For further details, contact place of purchase.

Storage
Seal container to keep out foreign material. Store in dark place.

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SYSTEM CONFIGURATION



Note 1: MU-100C is the standard supply monitor unit. An external monitor may be connected via the interface unit (option). The drawing above shows the system configuration with the MU-100C.

Note 2: For blackbox type, MU-100C is not supplied. Connect external monitor (user supply) and control unit to the interface unit.

EQUIPMENT LISTS

Standard Supply

Name	Type	Code no.	Qty	Remarks	
Control Unit/ Monitor Unit	CH-302/ MU-100C	-	1	Not supplied with blackbox type	
Control Unit	CH-302	-	1	Not supplied with unibody type	
Interface Unit	IF-8000	-	1	For blackbox type (not required for MU-151C)	
Transceiver Unit	CH-303	-	1		
Hull Unit	CH-304	-	1	400 stroke	See the following table for Hull Unit Standard Supply.
	CH-305	-		250 stroke	
Spare Parts	SP06-01101	006-556-200	1	For unibody type*	
	SP06-01102	006-556-210	1	For transceiver unit*	
	SP06-01103	006-558-990	1	For hull unit*	
	SP06-01111	006-556-220	1	For interface unit*	
Installation Materials	CP06-01200	000-068-496	1 set	06S4078 (5 m), 06S4080 (15 m), CP06-01251*	
	CP06-01201	000-068-497		06S4078 (5 m), 06S4080 (30 m), CP06-01251*	
	CP06-01202	000-068-498		06S4078 (5 m), 06S4080 (50 m), CP06-01251*	
	CP06-01203	000-068-499		06S4078 (10 m), 06S4080 (15 m), CP06-01251*	
	CP06-01204	000-068-500		06S4078 (10 m), 06S4080 (30 m), CP06-01251*	
	CP06-01205	000-068-502		06S4078 (10 m), 06S4080 (50 m), CP06-01251*	
	CP06-01261	006-562-580	1	For transceiver unit*	
	CP06-01501	006-561-620	1 set	For hull unit*	
	CP02-06600	000-012-486	1 set	MJ-A10SPF0002-0015 (0.15 m), for unibody type	
	CP02-06610	000-012-480		MJ-A10SPF0002-015 (1.5 m), for blackbox type	
	CP02-06620	000-012-481		MJ-A10SPF0002-050 (5 m), for blackbox type	
Accessories	FP02-05100	000-012-474	1 set	For unibody type, FP02-05101*, hood	
	FP06-01410	000-068-630		For control unit, FP06-01120*, hard cover	

*: See the lists at the back of this manual.

Hull Unit Standard Supply

Name	Type	Code no.	Qty	Remarks
Raise/lower Drive Unit	CH-3041	-	1 set	
	CH-3051	-		
Soundome	CH-3042	-	1 set	
Flange	CH-2543	006-557-810	1 set	See the lists at the back of this manual.
Assembly Kit for field	CH-2544	006-557-820	1 set	See the lists at the back of this manual.
Shaft	SHJ-0006	661-000-062	1	2.2 m, for 3.5/5.2 m cable
	06-007-1572	600-715-721		3.8 m, for 5.2m cable
Sonar Oil	4 lit.	000-824-033	1	

Options

Name	Type	Code no.	Qty	Remarks
Remote Controller	CH-256-E	000-068-492	1 set	
Interface Unit	IF-8000	-	1 set	
Motion Sensor	MS-100	-	1 set	
Monitor Unit	MU-100C	-	1 set	
Control Unit	CH-302-E	-	1 set	
Clinometer	BS-704	-	1 set	
Loudspeaker	SC-05WR	000-136-156	1	
Signal Cable	S06-9-5	006-556-270	1	Extension cable for loudspeaker
Rectifier	RU-1746B-2	000-030-439	1	
Cable assy.	MJ-A6SPF0012-050	000-134-424	1	6pin-6pin, 5m
	MJ-A6SPF0012-100	000-133-817		6pin-6pin, 10m
	MJ-A6SPF0011-050	000-132-244		6pin-4pin, 5m
	MJ-A6SPF0011-100	000-132-336		6pin-4pin, 10m
Control Unit Separate Kit	OP06-15-1.5 NEW	006-559-140	1	For desktop, with 1.5 m
	OP06-15-5 NEW	006-559-150		For desktop, with 5 m
	OP02-83-1.5	001-413-600	1	For flush mount, with 1.5 m cable
	OP02-83-5	001-413-610	1	For flush mount, with 5m cable
Flush mount kit	OP06-16	006-556-300	1	For unibody type
	OP06-17	006-556-310	1	For separated display unit
Control unit flush mount kit	OP06-18	006-556-320	1	
Tank	06-007-1570-2	600-715-702	1	Steel, 1m
	SHJ-0001-2	661-000-012	1	Steel, 1.8m
	06-007-1571-2	600-715-712	1	Steel, 3.5m
	06-021-4024-0	100-295-470	1	FRP, 1m
	06-007-1573-0	600-715-730	1	FRP, 1.8m
	OP10-5	000-069-763	1	Aluminum, 1m

1. MOUNTING

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

1.1 Monitor Unit/Control Unit

This searchlight sonar has two types of shipments, unibody type which is shipped with monitor unit, and blackbox type which is shipped without a monitor unit, but has an interface unit. For blackbox type, see page 1-5.

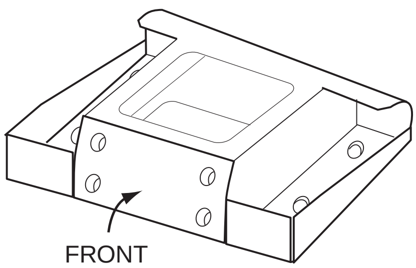
The control unit can be installed together with the monitor unit, or independently of the monitor unit. For separate installation, the optional monitor kit is required. These units can be installed on a tabletop or flush mounted in a console or panel.

1.1.1 General mounting considerations

- Keep the monitor unit out of direct sunlight.
- Select a location where the unit(s) can easily be operated while observing the fishing ground or area surrounding the vessel.
- For maintenance and checking purposes, leave sufficient space at the sides and rear of the unit and leave slack in cable. (Refer to the outline drawing at the back of this manual.)

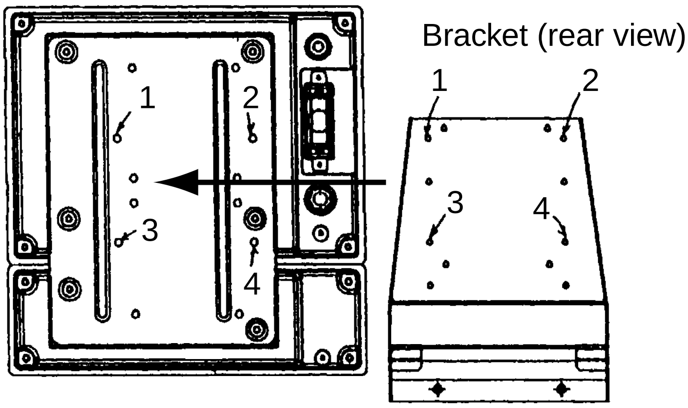
1.1.2 Mounting Unibody type

1. Fasten the mounting base to the mounting location with four self-tapping screws (5X20).



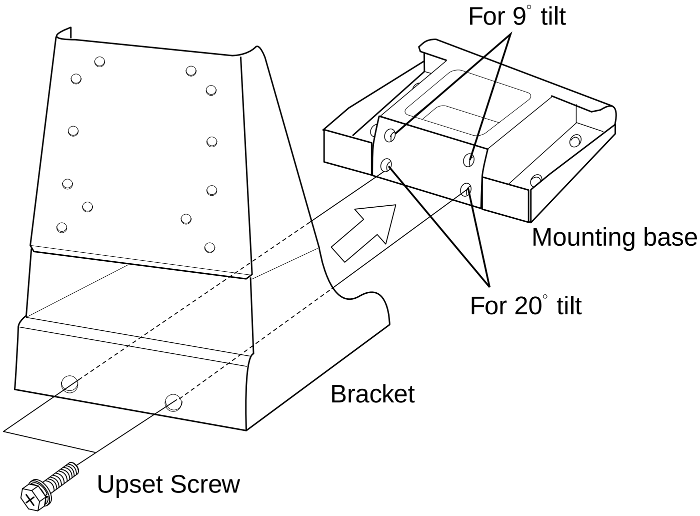
Mounting base

2. Fasten the bracket at the rear of monitor/control unit with four binding screws (M4x10).



Bracket, rear view

3. Coat threads of upset screws (M6x16, 2 pcs.) used to fasten bracket to mounting base.
4. Fasten the bracket to the mounting base with two upset screws. (Use the upper holes to tilt the monitor unit 20°; lower holes to tilt it 9°.)



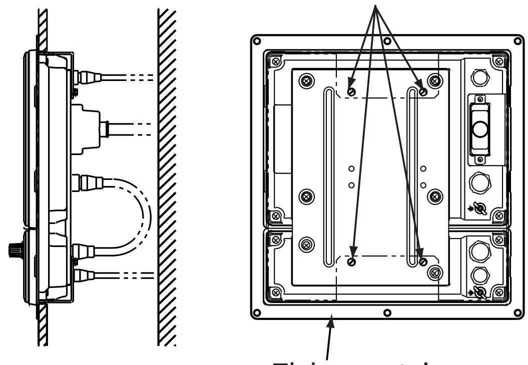
Fastening bracket to mounting base

Flush mounting

Flush mounting for unibody (Type: OP06-16, Code no.: 006-556-300)

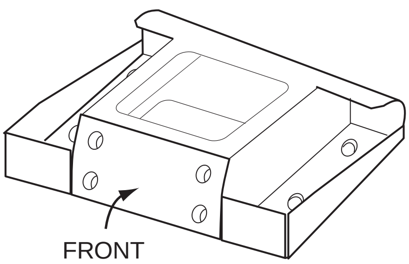
Name	Type	Code No.	Qty	Remarks
Fixing metal	06-021-1311-2	100-279-612-10	1	
Self-tapping screw	5x20	000-162-609-10	6	
Hex. bolt	M4x12	000-162-939-10	4	

1. Cut out a hole (W287 x H297) in the mounting location.
2. Fasten monitor/control unit with the fixing metal (supplied) and four hex. bolts (M4x12, supplied).
3. Fasten the fixing metal assembled at step 2 to hole made at step 1 with six self-tapping screws (5x20, supplied).



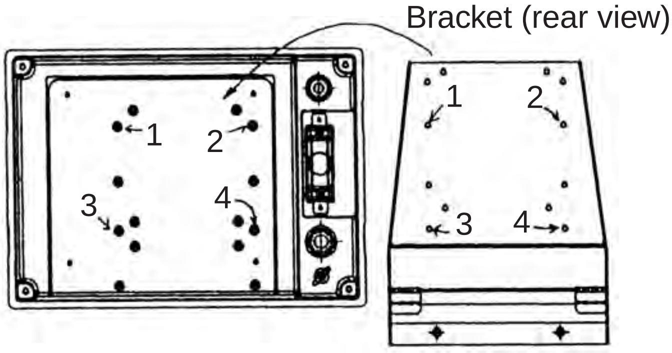
1.1.3 Mounting separated monitor unit

1. Fasten the mounting base to the mounting location with four self-tapping screws (5x20).



Mounting base

2. Dismount the coupling plate to separate monitor unit from control unit.
3. Attach the bracket at rear of the monitor unit with four binding screws (M4x10).



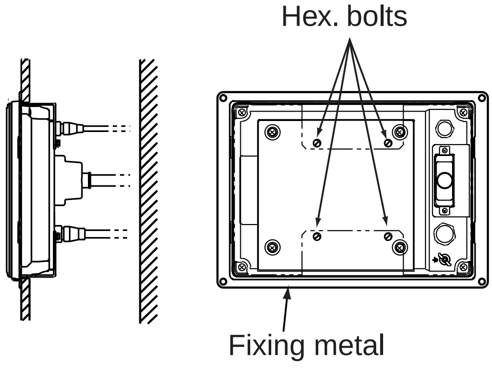
Bracket, rear view

4. Coat threads of upset screws (M6x16, 2 pcs.) used to fasten bracket to mounting base.
5. Fasten the bracket to the mounting base with two upset screws. (Use the upper holes to tilt the monitor unit 20°; lower holes to tilt it 9°.)

Flush mounting for monitor unit (Type: OP06-17, Code no. 006-556-310)

Name	Type	Code No.	Qty	Remarks
Fixing metal	06-021-1321-2	100-279-622-10	1	
Self-tapping screw	5x20	000-162-609-10	4	
Hex. bolt	M4x12	000-162-939-10	4	

1. Cut out a hole (W287 x H207) in the mounting location.
2. Fasten the fixing metal (supplied) to the monitor unit with four hex. bolts (M4x12, supplied).
3. Fasten the fixing metal assembled at step 2 to hole made at step 1 with four self-tapping screws (5x20, supplied).



1.1.4 Blackbox type

The blackbox type requires a VGA monitor, connected via the interface unit IF-8000. Supply commercial monitor and interconnection cable (Max. length 15 m with Dsub-15P connectors of male, three rows of 15 pins). The monitor used should satisfy the specifications shown below.

- VGA type
- ANALOG RGB 0.7 Vpp, positive polarity
- TTL level H, V, Negative polarity

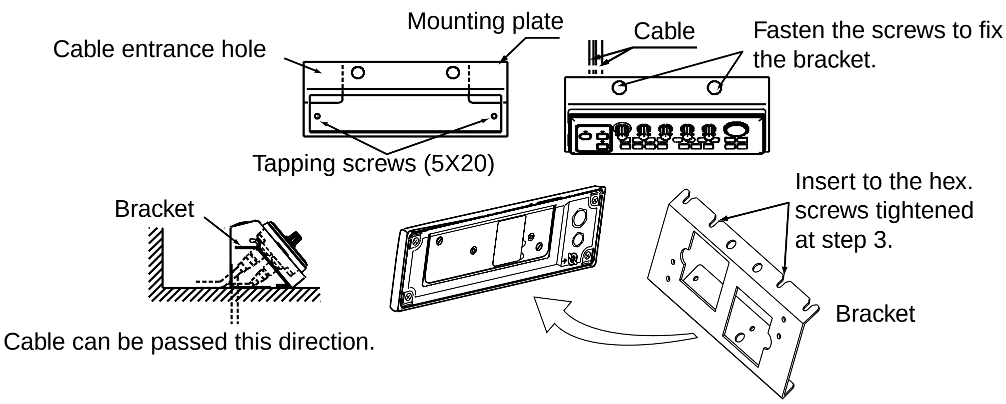
Note: The LCD monitor MU-151C does not require the interface unit IF-8000. For details, see the operator's manual for MU-151C.

1.2 Control Unit

For blackbox type, fix the control unit to the mounting plate (supplied as accessories).

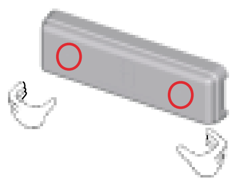
See the parts list of FP06-01120 and outline drawings at the back of this manual.

1. Fix the mounting plate to the place selected with two self-tapping screws (5X20, supplied).
2. Fix the bracket to the control unit with two hex. screws (M4X12, supplied).
3. Insert the screwdriver from the top of the mounting plate holes and then tighten two hex. screws (M4X12) loosely.
4. Attach the control unit to the mounting plate, and fasten two hex. screws tightly.
5. Attach two cosmetic caps to the holes at the top of the mounting plate.



6. Attach hard cover to protect the control unit.

How to remove the hard cover
Place your thumbs at the locations shown with circles in the illustration at right, and then lift the cover while pressing it with your thumbs.



To mount the control unit separate from the monitor unit, the optional control unit separate kit is required. Mount the control unit same as the above procedure. See the outline drawing at the back of this manual to mount.

Type: OP06-15-1.5 NEW Code no.: 006-559-140: with 1.5 m cable
Type: OP06-15-5 NEW Code no.: 006-559-150: with 5 m cable

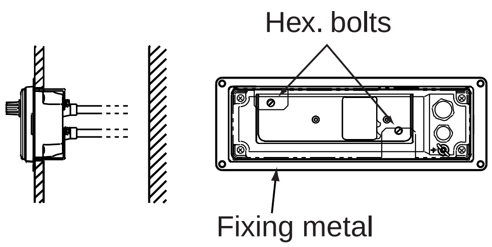
Name	Type	Code no.	Qty	Remarks
Cable	MJ-A10SPF0002-015	000-142-878	1	For 1.5 m cable
	MJ-A10SPF0002-050	000-131-411		For 5 m cable
Bracket	06-021-2112	100-281-880-10	1	
Mounting Plate	06-021-2111-1	100-279-741-10	1	
Self-tapping Screw	5x20	000-162-608-10	2	
Cosmetic Cap	DP-687	000-165-997-10	2	
Hex. bolt	M4x12	000-162-939-10	4	

Flush mounting for control unit

Type: OP02-83-1.5, Code no.: 001-413-600 (1.5 m cable)
Type: OP03-83-5, Code no.: 001-413-610 (5m cable**)**

Name	Type	Code No.	Qty	Remarks	
Fixing metal	06-021-2101-2	100-279-732-10	1		
Self-tapping screw	5x20	000-162-609-10	4		
Hex. bolt	M4x12	000-162-939-10	2		
Cable assembly	MJ-A10SPF0002-015	000-142-878	1	1.5 m	Select one.
	MJ-A10SPF0002-050	000-131-411	1	5 m	

1. Cut out a hole (W287 x H87) in the mounting location.
2. Fasten the fixing metal to the control unit with two hex. bolts (M4x12, supplied).
3. Fasten the fixing metal assembled at step 2 to holes made at step 1 with four self-tapping screws (5x20, supplied).



1.3 Transceiver Unit

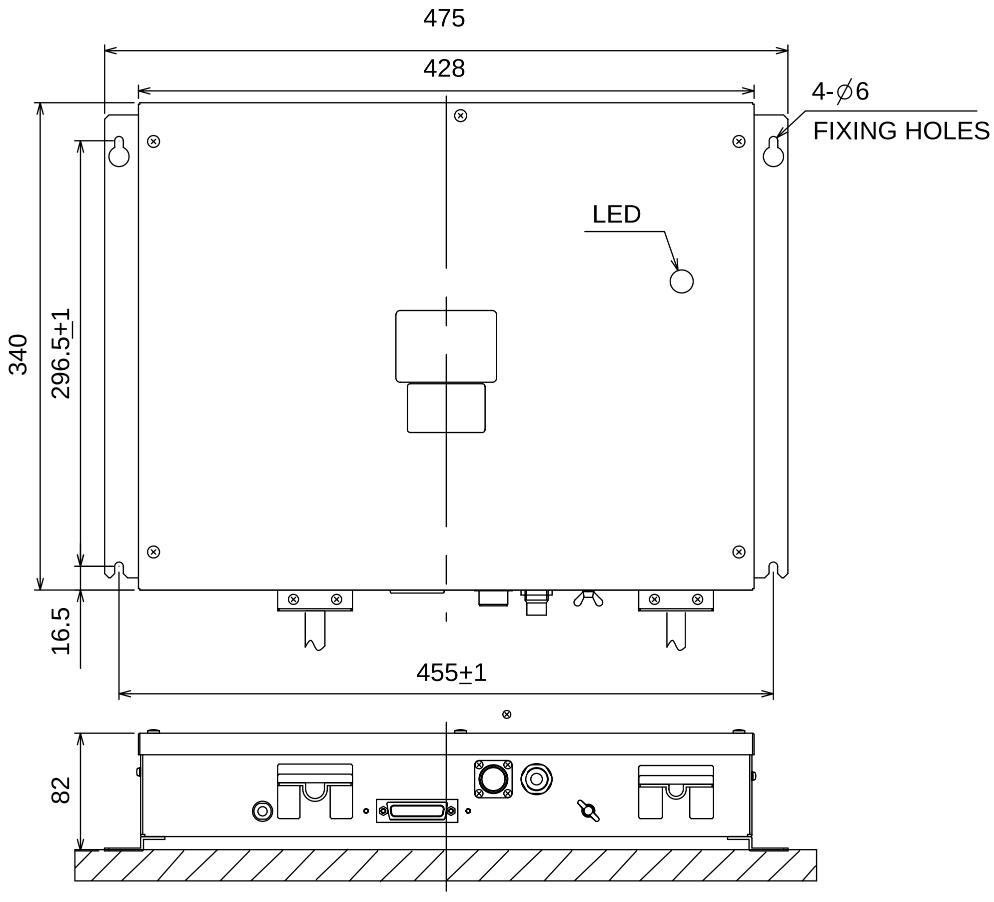
1.3.1 General mounting considerations

- The mounting location should be well ventilated and dry.
- The unit can be mounted on a bulkhead or the deck.
- The maximum cable length between the transceiver unit and the raise/lower drive unit is 50 m.
- The maximum cable length between the transceiver unit and the monitor (interface) unit is 10 m.
- Keep the transceiver unit out of splash.

1.3.2 Mounting method

Fasten the transceiver unit with four self-tapping screws (5X20, local supplied). For bulkhead mounting, do as follows:

1. Tighten upper self-tapping screws so there is 5 mm clearance between bottom of screw head and bulkhead.
2. Hook the transceiver unit on the upper screws.
3. Tighten the upper screws followed by the lower screws.



Transceiver unit

1.4 Hull Unit

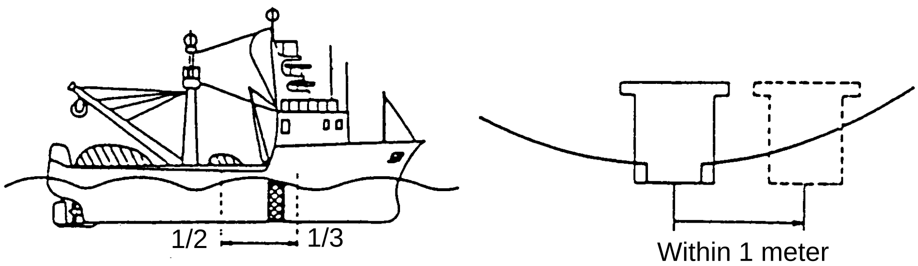
1.4.1 General mounting considerations

- Noise and air bubbles will affect performance.
- Do not turn on the equipment with the transducer exposed to air. Exposing the transducer to air may damage it.

1.4.2 Installation position considerations

Discussion and agreement are required with the dockyard and ship owner in deciding the location for the hull unit. When deciding the location, take into account the following points:

- Select an area where propeller noise, cruising noise, bubbles and interference from turbulence are minimal. Generally, the point at 1/3 to 1/2 of the ship's length from the bow or near the keel is the best. On-the-keel installation is advantageous for minimizing oil consumption in comparison with off-the-keel. If the hull unit cannot be installed on the keel, the center of the retraction tank should be within 1 meter of the keel to prevent a rolling effect.



Installation location for hull unit

- Select a place where interference from the transducers of other sounding equipment is minimal. The hull unit should be at least 2.5 meters away from the transducers of other sounding equipment.
- An obstacle in the fore direction not only causes a shadow zone but also aerated water, resulting in poor sonar performance. Be sure to locate the transducer well away from any obstacle in the fore direction.

<u>Mounting method</u>

A typical mounting method is shown in the outline drawing at the back of this manual. Consult ship's owner, dockyard and user to determine appropriate mounting method. Pay attention to safety (strength, watertightness) first, followed by ease of maintenance and inspection.

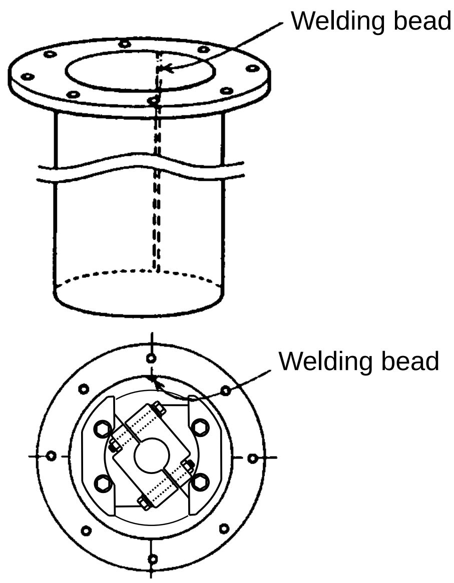
1.4.3 Transducer tank

Tank length

Shorten the transducer tank so the transducer is lowered into water as deep as possible. Pay particular attention to the tank length Lt. Determine the length of the main shaft.

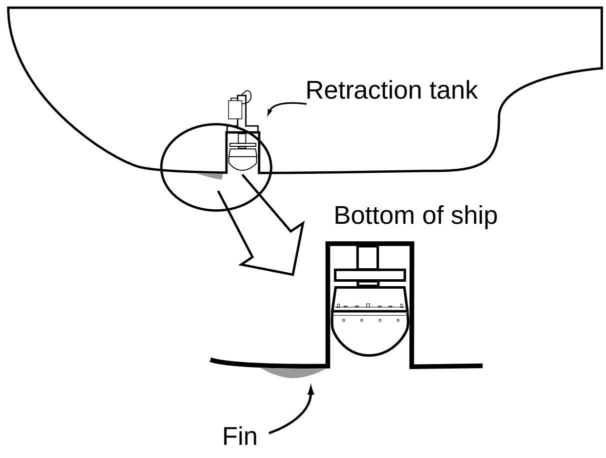
- Length of main shaft = Lt + 200 mm (for 400 stroke)
- Length of main shaft = Lt + 50 mm (for 250 stroke)

Note: When the retraction tank is constructed locally, finish it so that welding beads do not protrude on the inner surface of the tank. The tank guide will hit the bead, burning out the raise/lower motor. Also, do not position the welding bead in the ship's fore-aft line.



For small FRP ship

The retraction tank should be mounted in parallel with the ship's draft. For a small ship, however, the hull has 2 degrees of tilt rising toward the bow. This creates high water pressure in the tank because of the resistance at the rear of the tank well. To solve this problem, attach a fin to the hull at the location shown in the figure below.



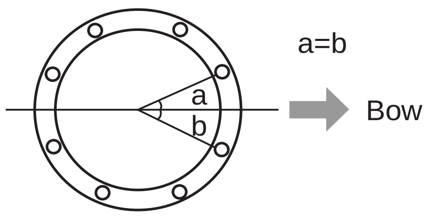
This fin creates a smooth stream in the retraction dome. Fin specifications: Height, 1-1.5 cm, Material, FRP.

Mounting of transducer tank

Install the transducer tank referring to the hull unit outline drawings at the back of this manual.

Note 1: When making a retraction tank locally, the inside diameter of the retraction tank should be $\phi190\pm0.5$ as shown in the outline at the back of this manual. If larger, the hull unit may be damaged.

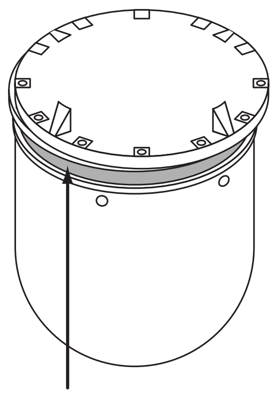
Note 2: Locate the retraction tank so that the center of any two bolt holes is facing the ship's bow.



1.4.4 Assembling and mounting of hull unit

The hull unit is shipped as the parts shown in the hull unit kit in the Equipment Lists (page v). Assemble the hull unit as shown in the procedure below.

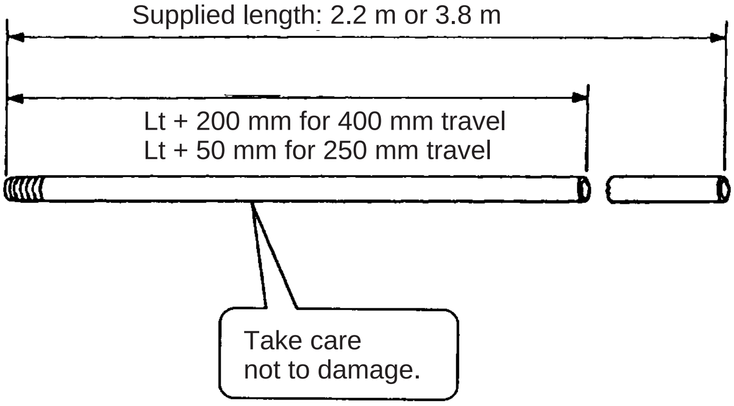
Note: Confirm the frequency of soundome before mounting by referring to the table below.

Frequency	Specification	
60/153 kHz	There is NO label attached on the dome.	
85/215 kHz	There is the label "85/215 kHz" attached on the dome.	

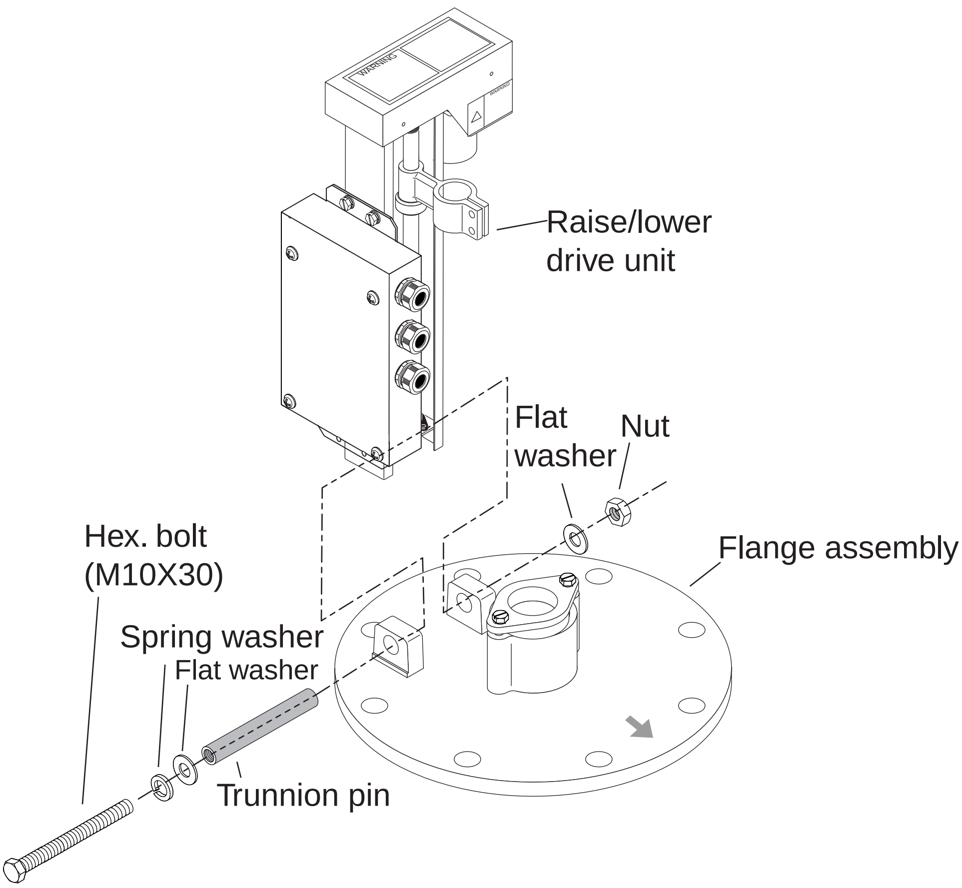
Necessary tools

Name	Specification	Remarks
Wrench	For M10 (Hex. size 17 mm)	Recommended: double offset wrench
Wrench	For M20 (Hex. size 30 mm)	
Pipe Wrench	55 mm	For fixing gland
Ball Wrench	Hex size 4 mm	For fixing the dome

1. Calculate necessary length of main shaft from the length of retraction tank Lt and cut off the unnecessary portion.



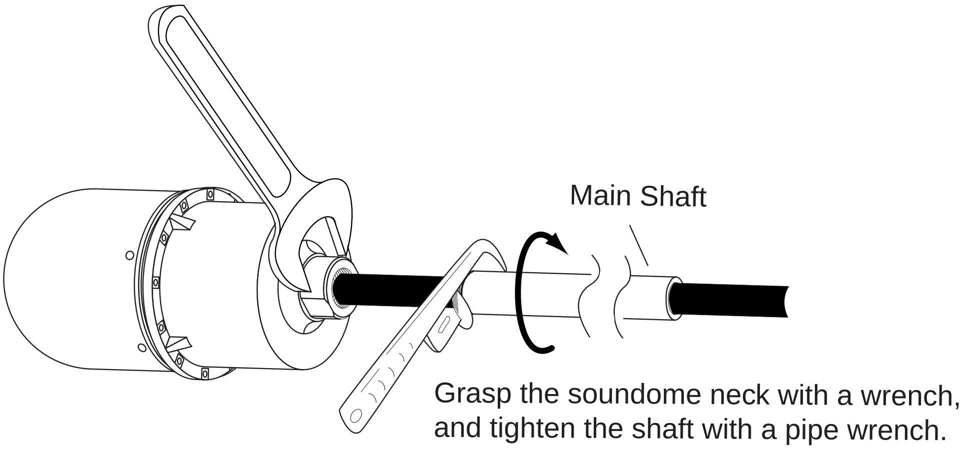
2. Remove hex bolt, nut, spring washers, flat washers and trunnion pins from the main body flange. Then, mount the raise/lower drive unit on the shaft sleeve by using the hardware removed.

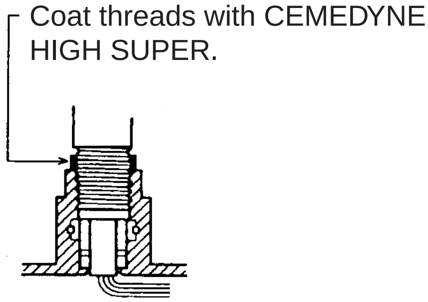


Shaft sleeve and raise/lower drive unit assembly

3. Pass the transducer cable through the main shaft.

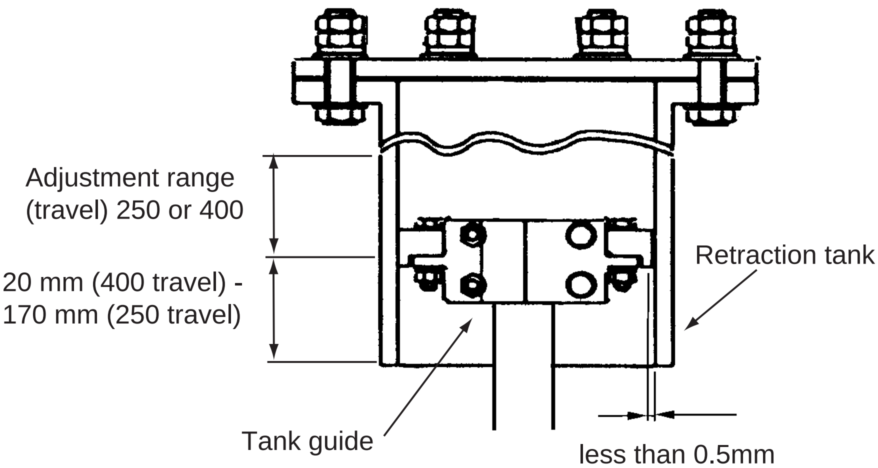
4. Fully screw main shaft into the soundome neck, and then unscrew by four turns. Coat threads with CEMEDINE HIGH SUPER.





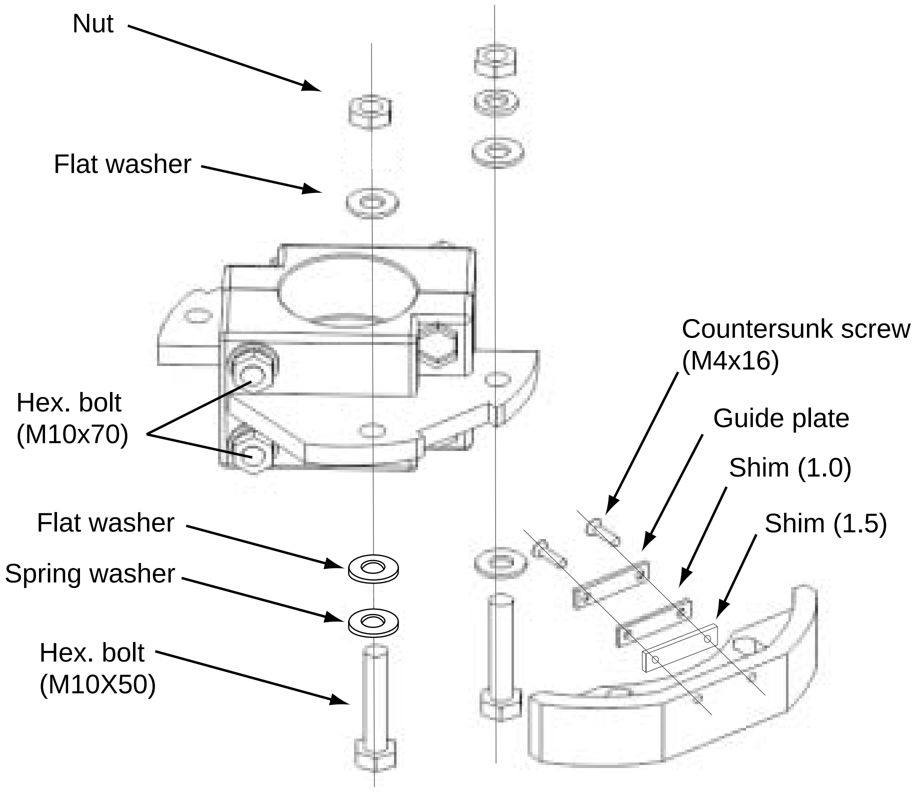
Applying CEMEDINE HIGH SUPER to main shaft

5. Screw in main shaft completely.
6. As shown in the drawing below, confirm that the narrowest gap between the tank guide, and retraction tank in the range (20 to 170 mm) is within 0.5 mm.



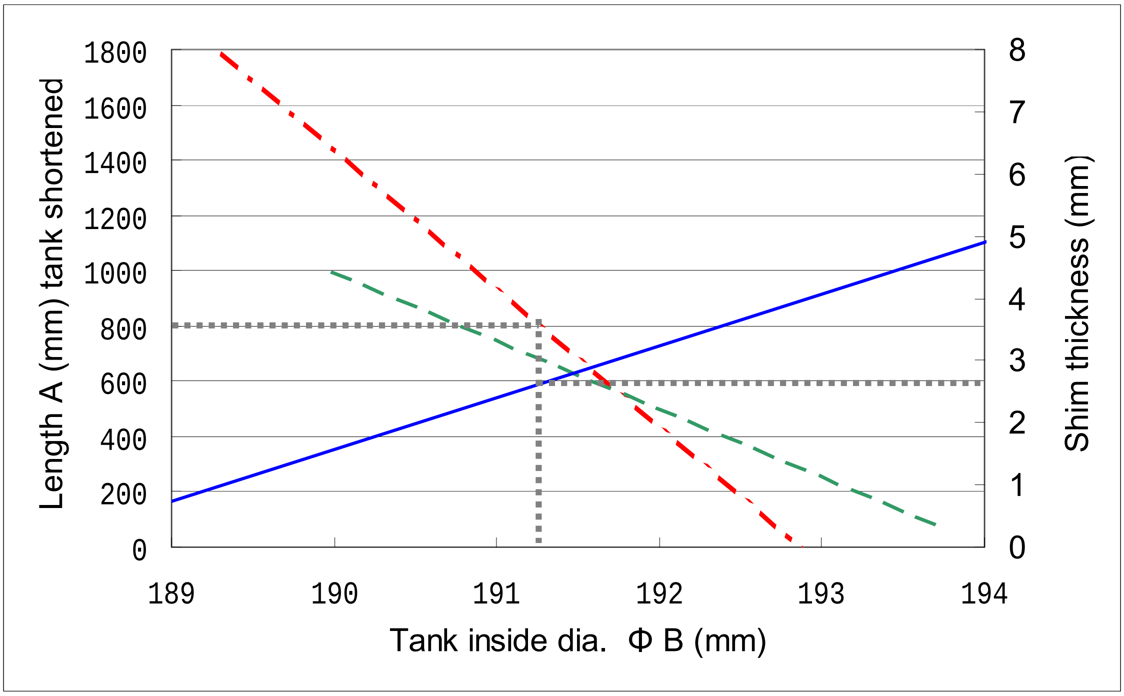
Tank and tank guide, sectional view

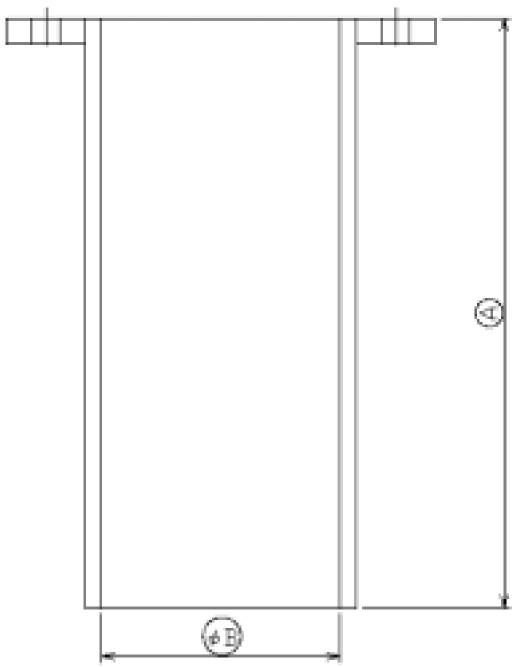
7. If the gap at a side is more than 0.5 mm, install shim(s) to make the gap within 0.5 mm.
   a) Unscrew four M10x50 bolts.
   b) Unscrew four countersunk screws, then attach shim(s) with the countersunk screws as shown below.

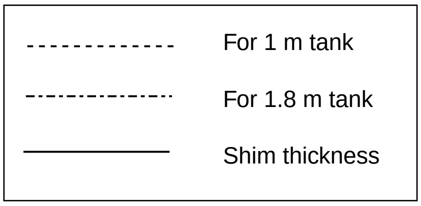


Installing shims

The table below shows tank length and necessary shim thickness. In addition, the shim thickness shown is for one side. For example, when cutting the 1800 mm tank to 800 mm, the tank inside diameter is 191.25 mm, and shim thickness is 2.5 mm as shown the table in below.



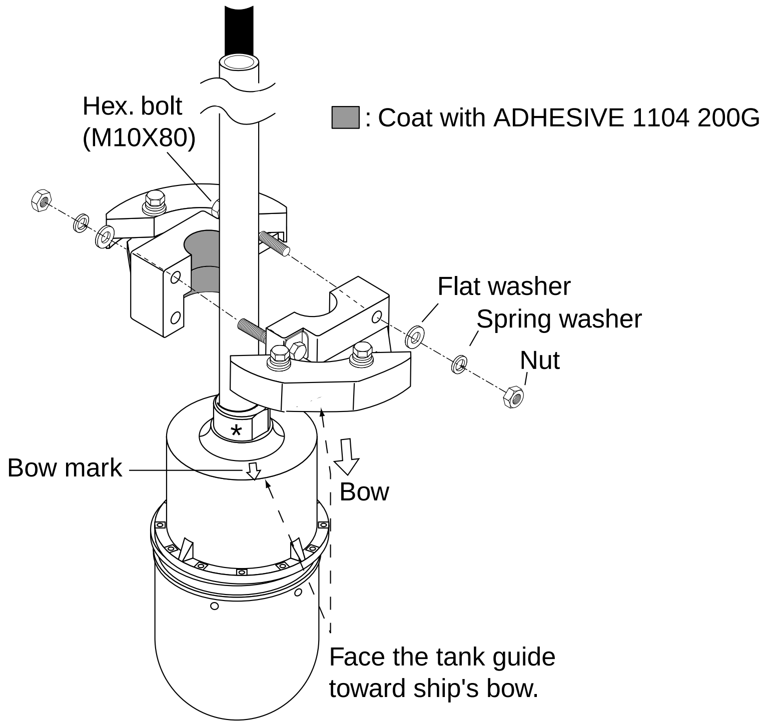




The table below shows number of shims required and shim thickness.

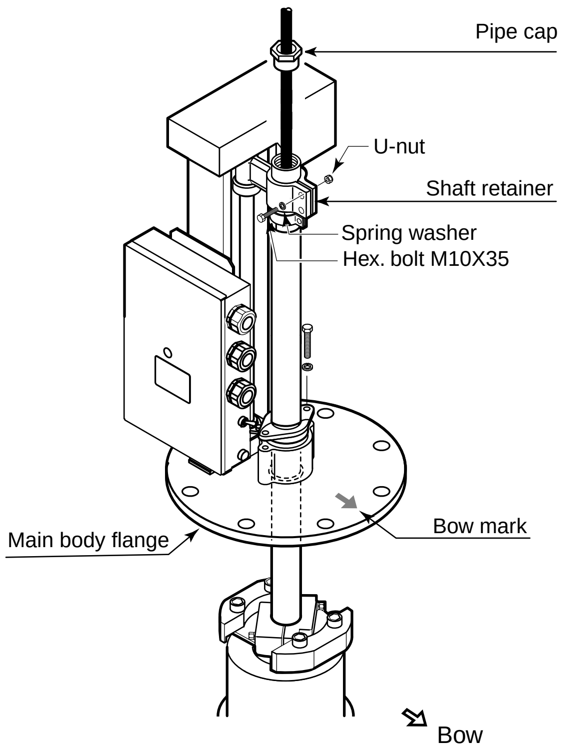
Shim thickness	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5
t2.0					1	1	1	1	2	2	2	2	2	2
t1.0			1	1			1	1			1	1	2	2
t0.5		1		1		1		1		1		1		1
Inside dia of tank	188.1	188.7	189.3	189.9	190.5	191.1	191.7	192.3	192.9	193.5	194.1	194.7	195.3	195.9

8. Coat the inside of the tank guide with ADHESIVE 1104 200G. Then, fasten tank guide at the neck of the main shaft securely with M10X80 bolts.

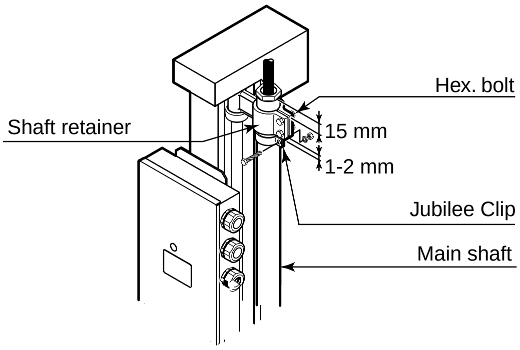


Tank guide attachment

9. Pass the main shaft through the flange assembly.
10. Pass the main shaft through the shaft retainer at the raise/lower drive unit.

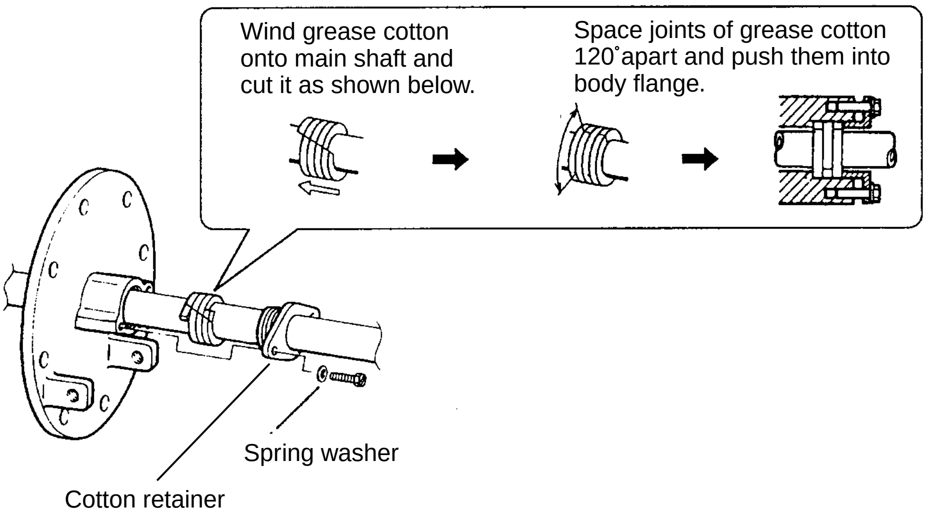


11. Align the bow mark on the soundome with the bow mark on the flange assembly, and then fix the main shaft with and shaft retainer.
12. Fix the jubilee clip to the main shaft.



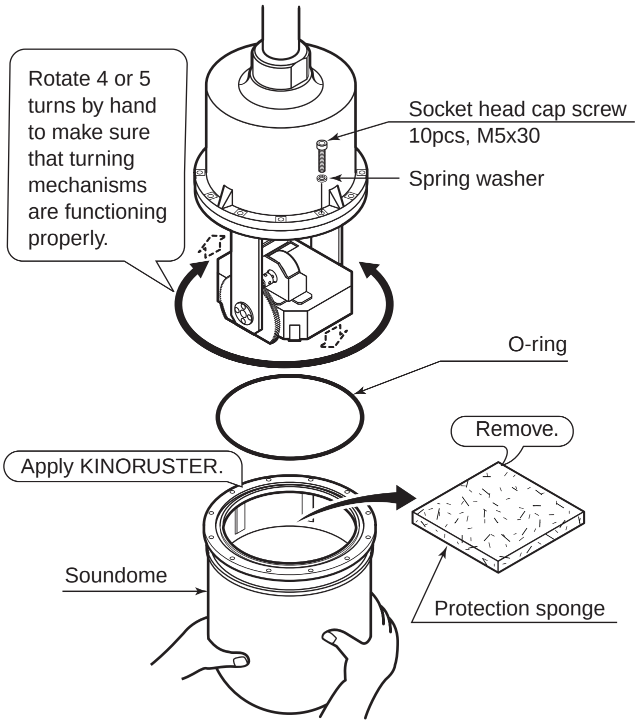
Note: Attach the shaft retainer so it is 15 mm from the top of the shaft. The soundome is then placed 10 mm above the bottom of tank when retracted.

13. Insert grease cotton (supplied with flange assembly), and fix them with the cotton retainer as follows.
    a) Wind grease cotton onto main shaft.
    b) Mark on the cotton as below.
    c) Remove the cotton from the shaft, and then cut it at the position of the mark. Discard the ends.
    d) Wind cottons as shown below.
    e) Push cottons into the flange assembly.
14. Tighten the grease cotton retainer.



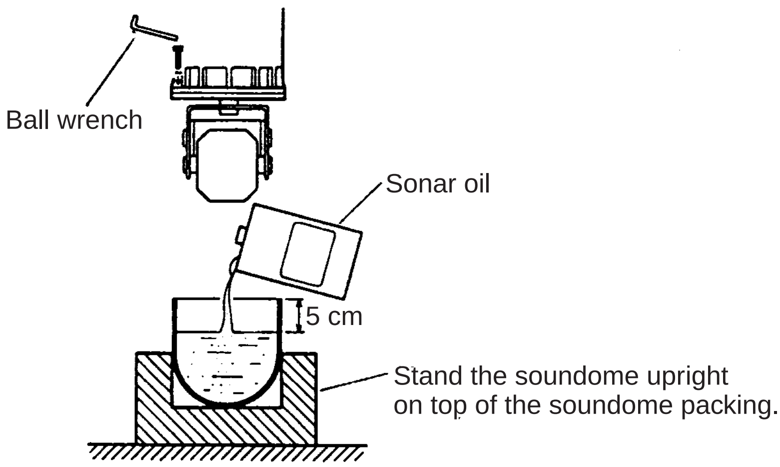
Installing grease cotton on the main shaft

15. Fasten the pipe cap (supplied) to main shaft.
16. Unscrew 10 pcs of M5X35 socket head cap screws with soundome fixing tool to dismount soundome.
17. Remove and discard the protection sponge placed in soundome.



Detaching the soundome

18. Stand the soundome upright on top of the soundome packing. Fill the soundome with oil (supplied) so the level is 5 cm from the top of the soundome. Keep the soundome packing for future use.



Filling the soundome with sonar oil

⚠ CAUTION

Keep oil away from eyes. Where protective goggles when working with the oil. The oil cause inflammation of the eyes.

Do not touch the oil. The oil can cause inflammation of the skin. Wear protective gloves when working with the oil.

Do not ingest the oil. Diarrhea or vomiting can result.

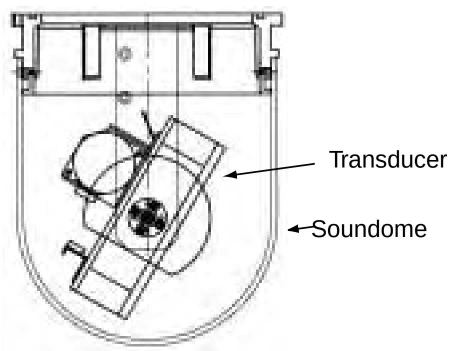
Keep the oil out of reach of children.

EMERGENCY
If the oil enters the eyes, flush with clean water about 15 minutes. Consult a physician. If oil contacts skin, wash with soap and water. If the oil is ingested, see a physician immediately.

DISPOSAL OF OIL AND ITS CONTAINER
Dispose of oil and its container in accordance with local regulations.
For further information, contact place of purchase.

STORAGE
Seal container to keep out foreign material.
Store in dark place.

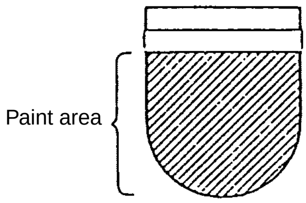
19. Rotate the transducer manually to position it at the angle shown below, and then refit the soundome.



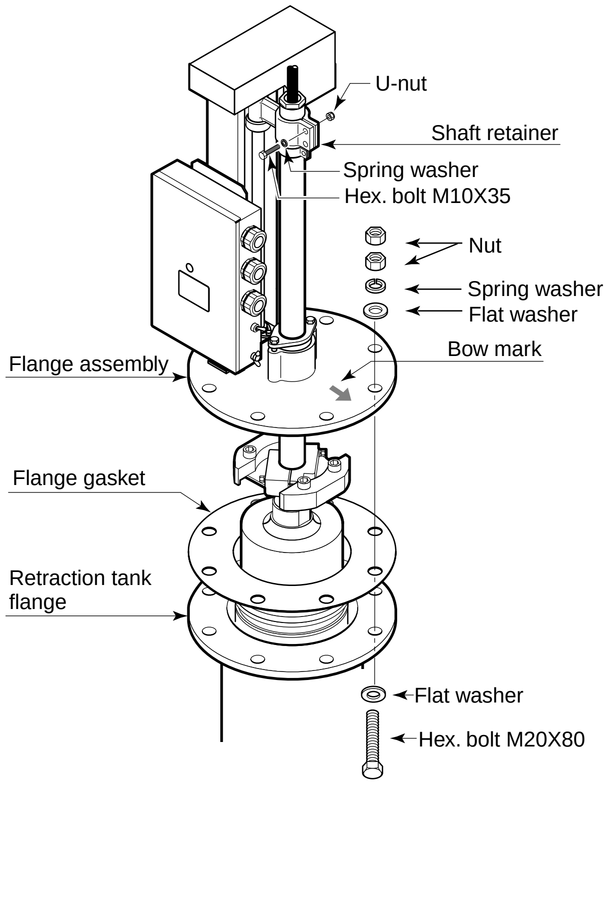
Note 1: Do not lay the oil-filled soundome down for five minutes. Oil may leak.

Note 2: When the soundome is painted (to keep marine life off the transducer), observe the following precautions:

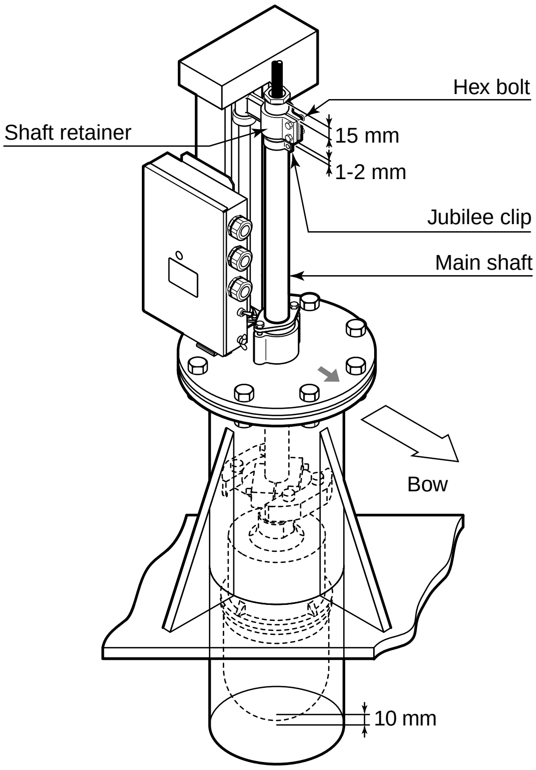
- Use only anti-fouling paint type MARINE STAR 20 (Manufacture: Chugoku Marine Paint Co., Ltd., Japan).
- Paint only the plastic portion of the dome. Painting the metal parts causes electric corrosion.



20. Clean surface of gasket, tank flange and shaft sleeve, and then coat flange gasket with ADHESIVE 1104 200G.
21. Lightly coat bolts, nuts and washers with KINORUSTER.
22. Set the hull unit into the retraction tank, taking care not to damage the soundome.



23. Fix the shaft sleeve and retraction tank with hex bolts, flat washers and spring washers.



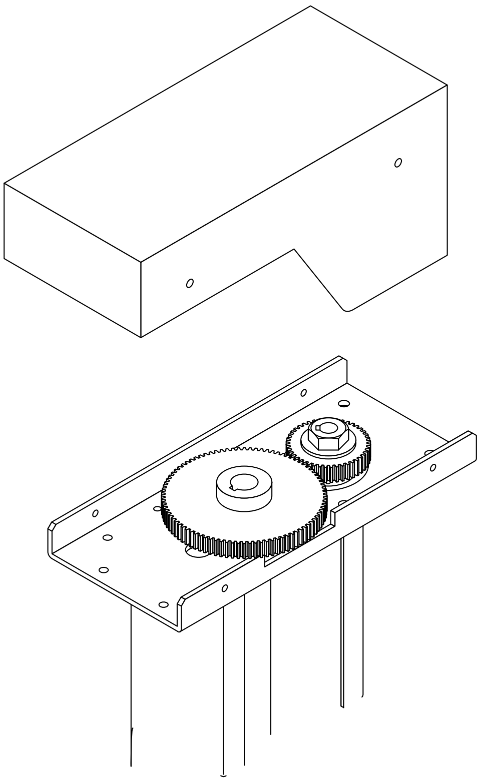
Checking manual raise/lower of soundome with hand crank

Perform this check after all wiring has been completed.

⚠ CAUTION
Turn the main power off before this check, otherwise the raise/lower motor action may cause injury.

1. Turn off the breaker on the hull unit.
2. Detach the gear cover.
3. Set wrench (opposite side19 mm) to the screw shaft gear.
4. The transducer should rise/lower smoothly with even force in upper to lower limits. If not, the centers of the shaft sleeve and the retraction tank are not aligned. Adjust the hull mounting position if necessary. Check the following points.

- Painting inside tank not smooth.
- Inner diameter of tank not uniform.
- Welding bead is obstructing raising and lowering.

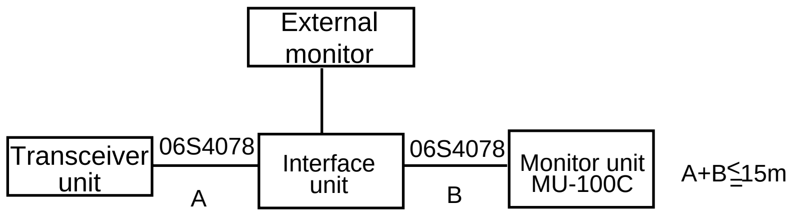


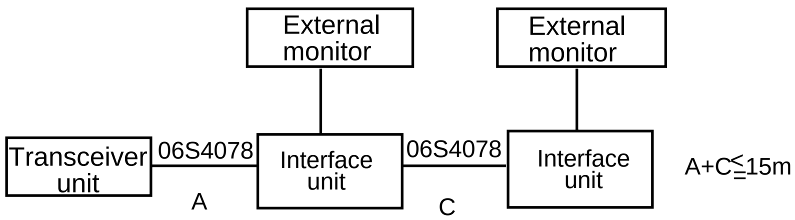
1.5 Interface Unit

The interface unit is shipped with the blackbox type to enable connection of a monitor. Note that this unit is not necessary when using monitor MU-151C.

1.5.1 General mounting considerations

- The mounting location should be well ventilated and dry. Avoid locations subject to water splash or rain.
- The unit can be mounted on a bulkhead or the deck.
- The maximum cable length between the interface unit and the transceiver unit is 10 m. Keep the length in mind when choosing a mounting location.

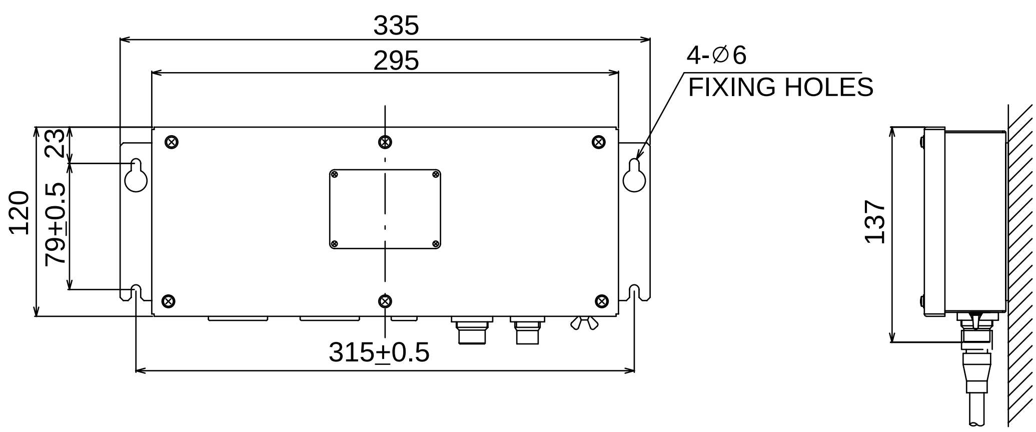




1.5.2 Mounting method

Fasten the interface unit with four self-tapping screws (5X20, local supplied). For bulkhead mounting, do as follows:

1. Tighten upper self-tapping screws so there is 5 mm clearance between bottom of screw head and bulkhead.
2. Hook the transceiver unit on the upper screws.
3. Tighten the upper screws followed by the lower screws.



1.6 Motion Sensor MS-100 (option)

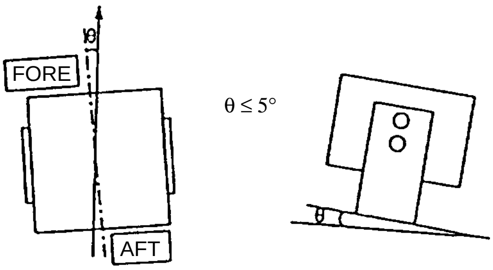
The MS-100 measures ship's pitching and rolling angles with a sensor, using the principles of the gyroscope. The MS-100 is free from error caused by ship's vertical and horizontal motion. Therefore, it can be installed at any convenient location. However, ship's semi-permanent inclination due to loading imbalance cannot be detected. Compensate for this as described in Chapter 3.

1.6.1 Mounting considerations

- Vibration in the mounting area should be minimal.
- Locate the unit away from areas subject to water splash.
- The ambient temperature should not exceed 50°C.

1.6.2 Mounting procedure

Orient the FORE mark on the unit toward the ship's bow and mount the unit level to within 5° in all directions. For the offset, see Chapter 3.



1.7 Clinometer BS-704 (option)

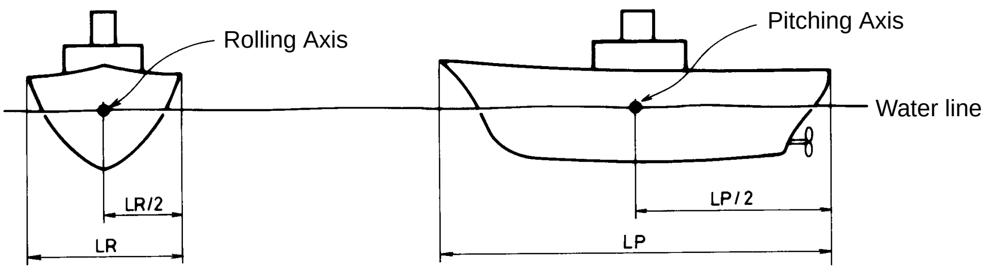
The clinometer detects ship's inclination caused by ship's rolling, pitching and its output is used to stabilize the sonar beam against rolling and pitching.

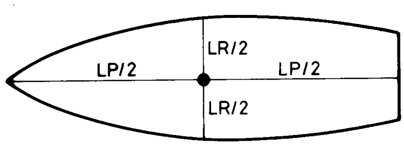
The clinometer is, in principle, a pendulum. It measures the inclination of the ship by sensing the direction of gravity acted on it and therefore when installed on a ship, it should be placed on or near the rotation axes of the ship's rolling and pitching. If it is placed away upward from the axes, the measured value becomes larger than the actual value. On the other hand, if it is placed below the axes, the measured value is smaller than actual value. The same can be said when it is placed far to the left or right from the axes.

The rotation axes of pitching and rolling are theoretically considered to be located on the level of the ship's draft and in the center of the ship. In other words, as follows:

1. Vertical position of the pitching and rolling axes is on the draft level of the ship.
2. Horizontal position of the rolling axis is in the center of the ship's port-starboard line.
3. Horizontal position of the pitching axis is in the center of the ship's fore-aft line.

From 1, 2 and 3 above, the crossing point of the two axes is indicated by the black dots in the illustration below. The clinometer should be mounted as close as possible to this point.



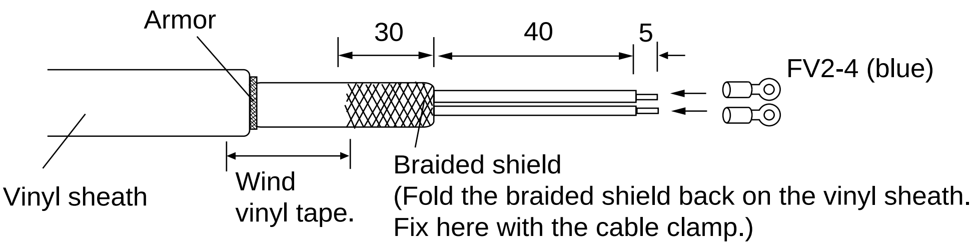


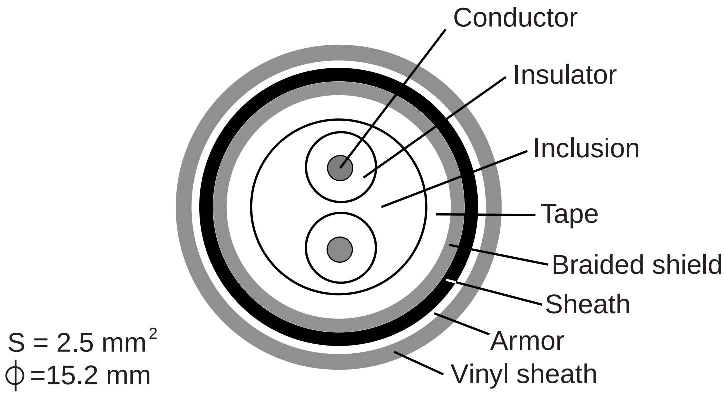
Note 1: The area near the hull unit is too low to install the Clinometer and should be avoided, since the polarity of the measured value is reversed.
Note 2: When it is impossible to install the clinometer on the intersecting point of both rolling and pitching rotational axes, a special effort should be made to install it at a place where the vertical distance to the intersecting point is shortest.
Note 3: Install the clinometer with the bow mark pointing toward ship's bow.
Note 4: Be sure to adjust the clinometer following the procedure in section 3.6.

2. WIRING

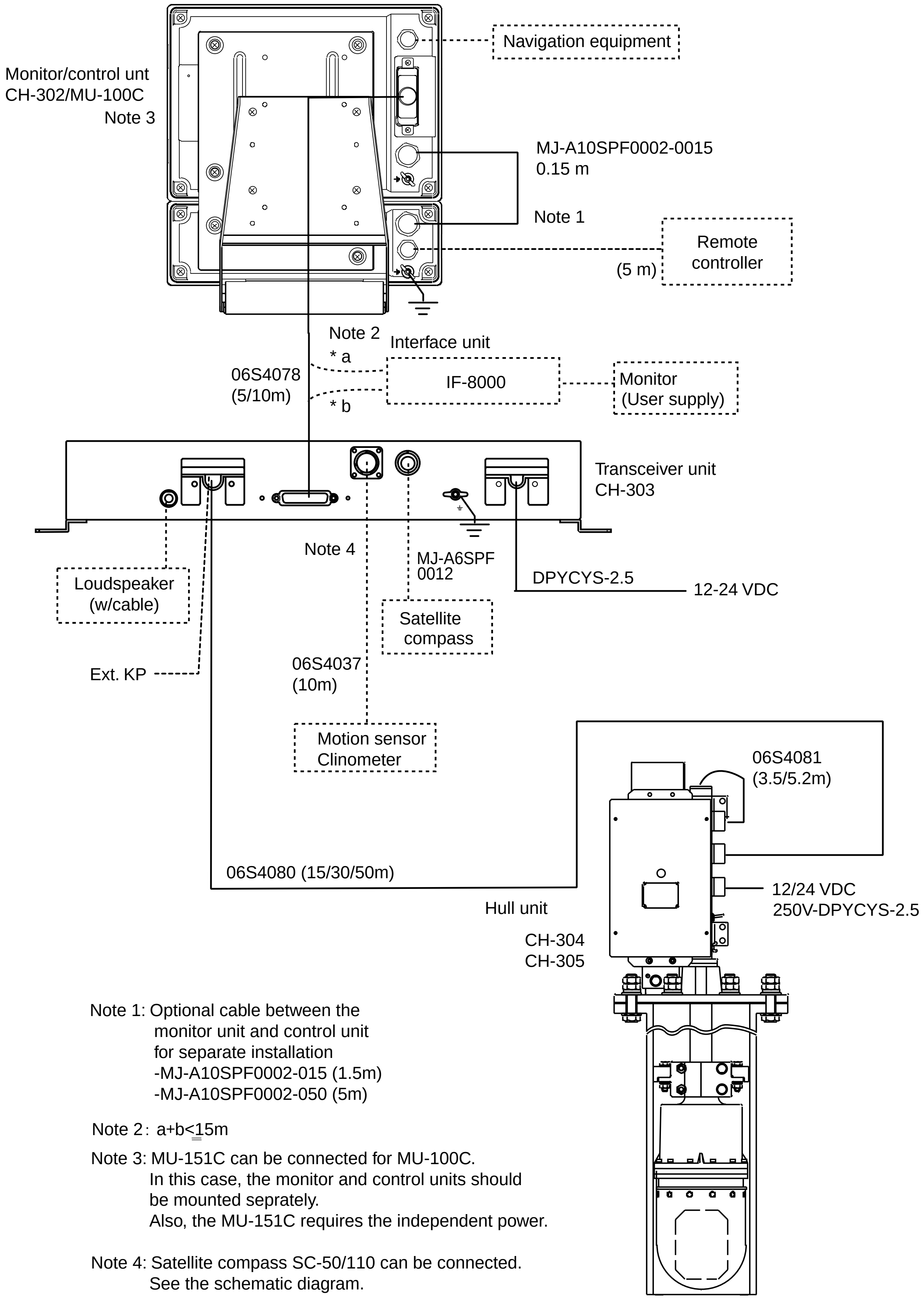
2.1 Wiring Among Units

- The figure on the next page shows wiring among units.
- The signal cables are fitted with connectors. Connect the cables to the monitor, transceiver and hull units referring to the interconnection diagram on page S-1.
- The power cable should be arranged locally. Use power cable type DPYCYS-2.5 (Japan Industrial Standard cable) or equivalent cables. Attach crimp on lugs (FV2-4) as shown below.





- The raise/lower drive motor and breaker are different depending on ship’s mains.
- Install the mains switch for the sonar where it can be easily accessed. Turn off this switch when the sonar is not being used, to reduce power consumption and to prevent the transducer from slipping by vibration.
- If the D-sub connector is too large to pass through the hole in a bulkhead, etc. remove it, pass the cable through the hole and then reattach the connector.



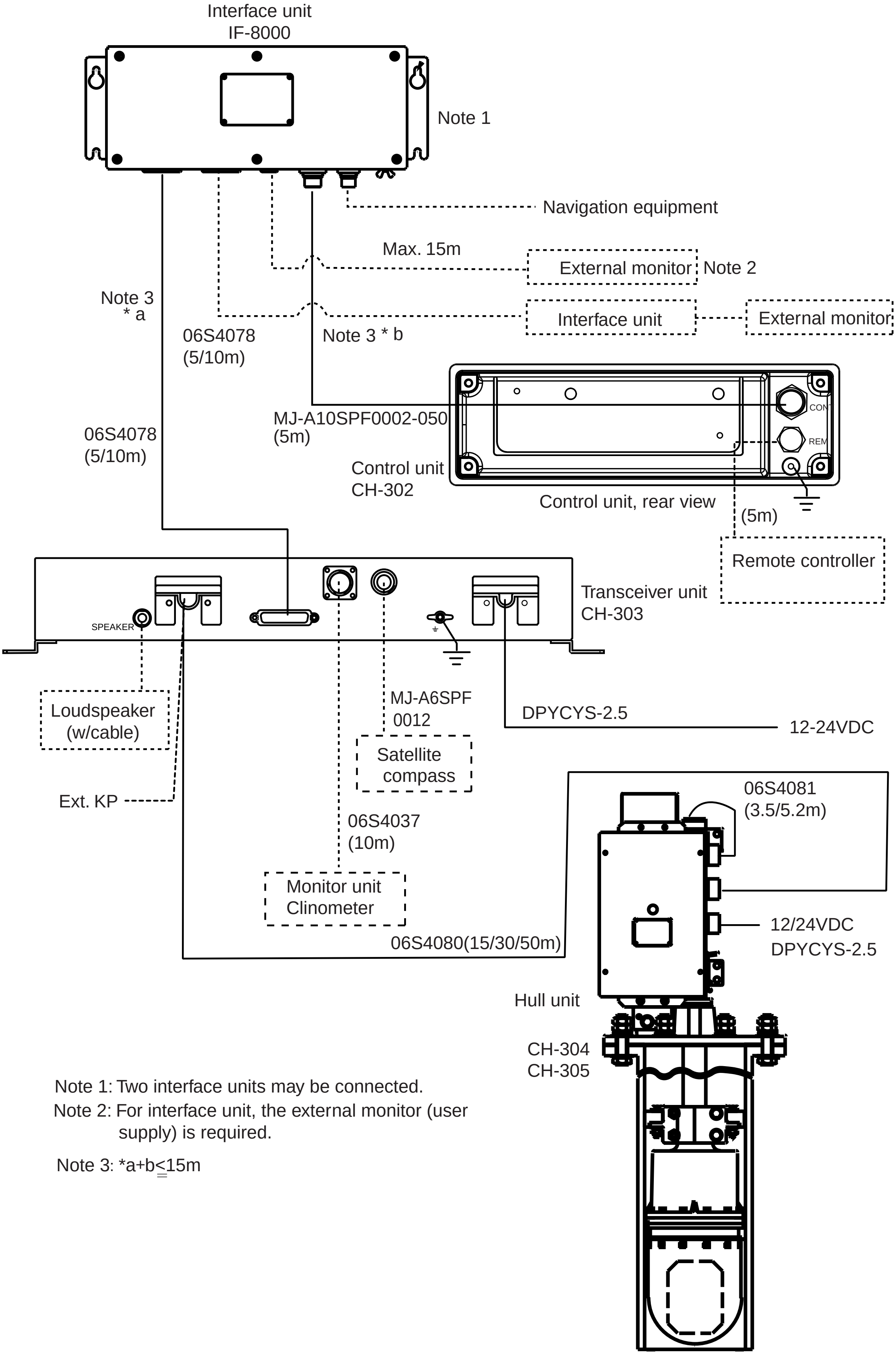
Note 1: Optional cable between the monitor unit and control unit for separate installation
-MJ-A10SPF0002-015 (1.5m)
-MJ-A10SPF0002-050 (5m)

Note 2: a+b≦15m

Note 3: MU-151C can be connected for MU-100C.
In this case, the monitor and control units should be mounted seprately.
Also, the MU-151C requires the independent power.

Note 4: Satellite compass SC-50/110 can be connected.
See the schematic diagram.

Wiring, with monitor



Note 1: Two interface units may be connected.

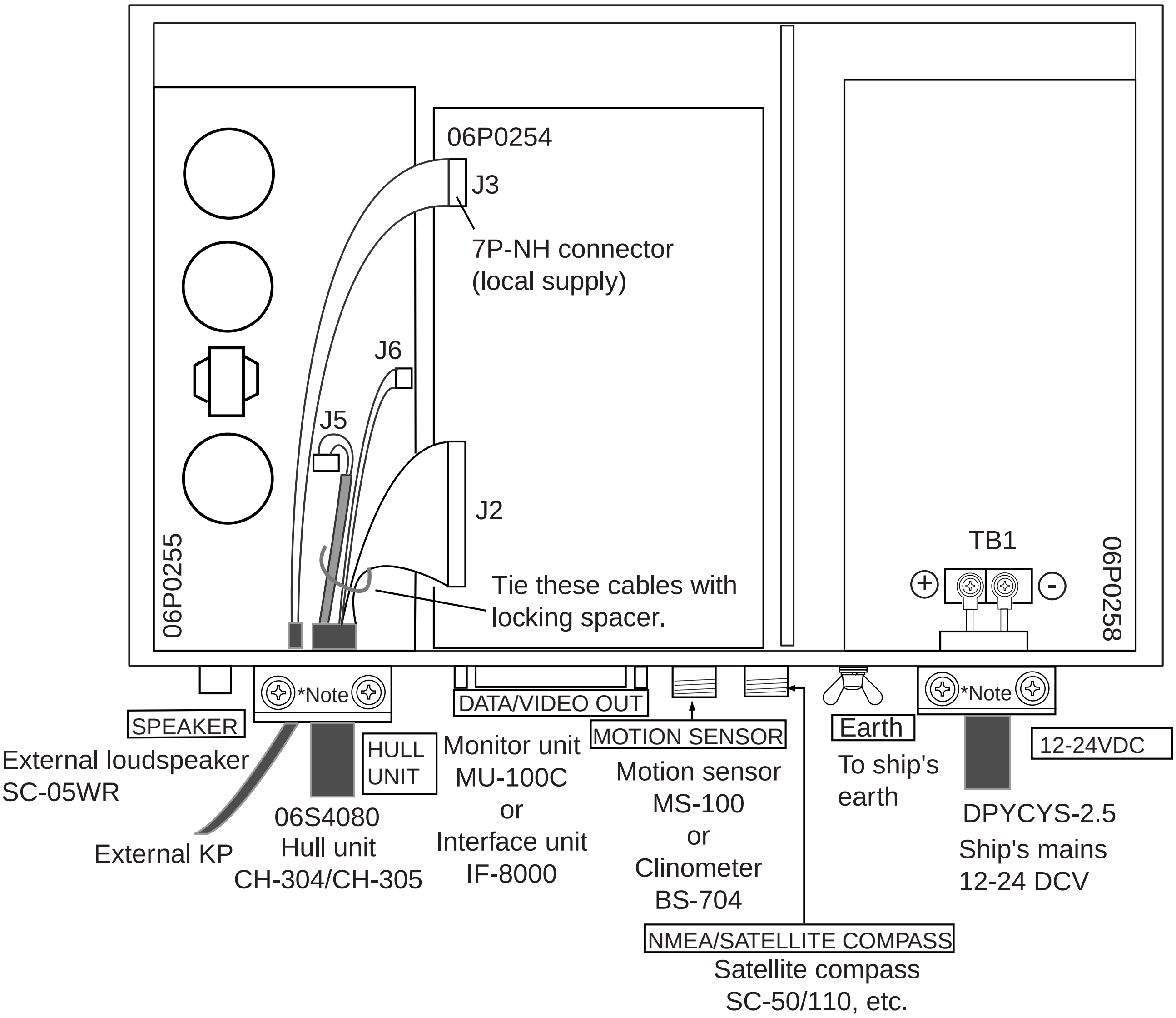
Note 2: For interface unit, the external monitor (user supply) is required.

Note 3: *a+b≦15m

Wiring, without monitor

2.2 Transceiver Unit

Connect the cables as shown in the figure below.

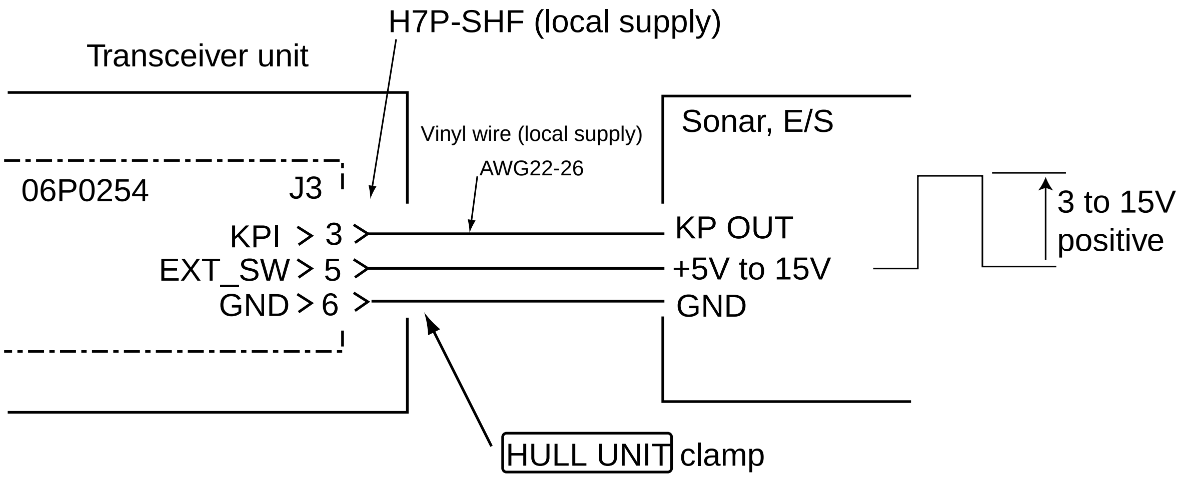


*: Fix the braided shield with the clamp.

Transceiver unit, internal view

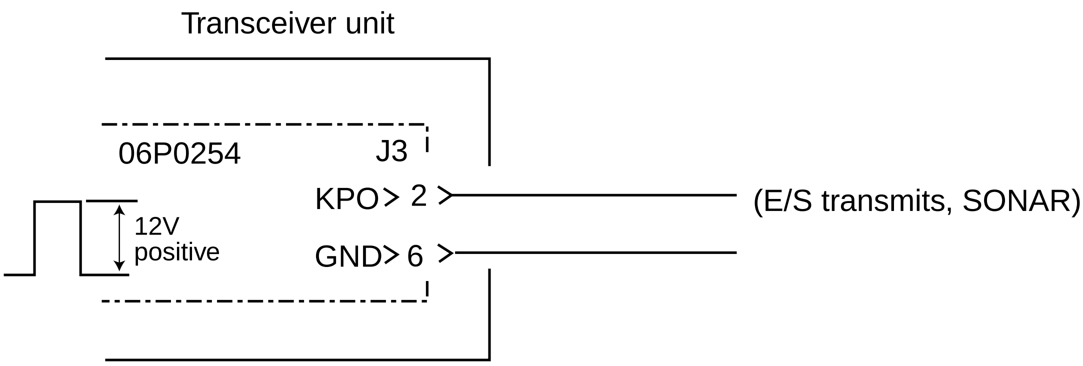
Synchronizing Transmission with Echo Sounder or Other Sonar

To synchronize transmission of the CH-300 with an echo sounder or other type of sonar, connect it as shown below.



Connection of transceiver unit to other sonar/echo sounder

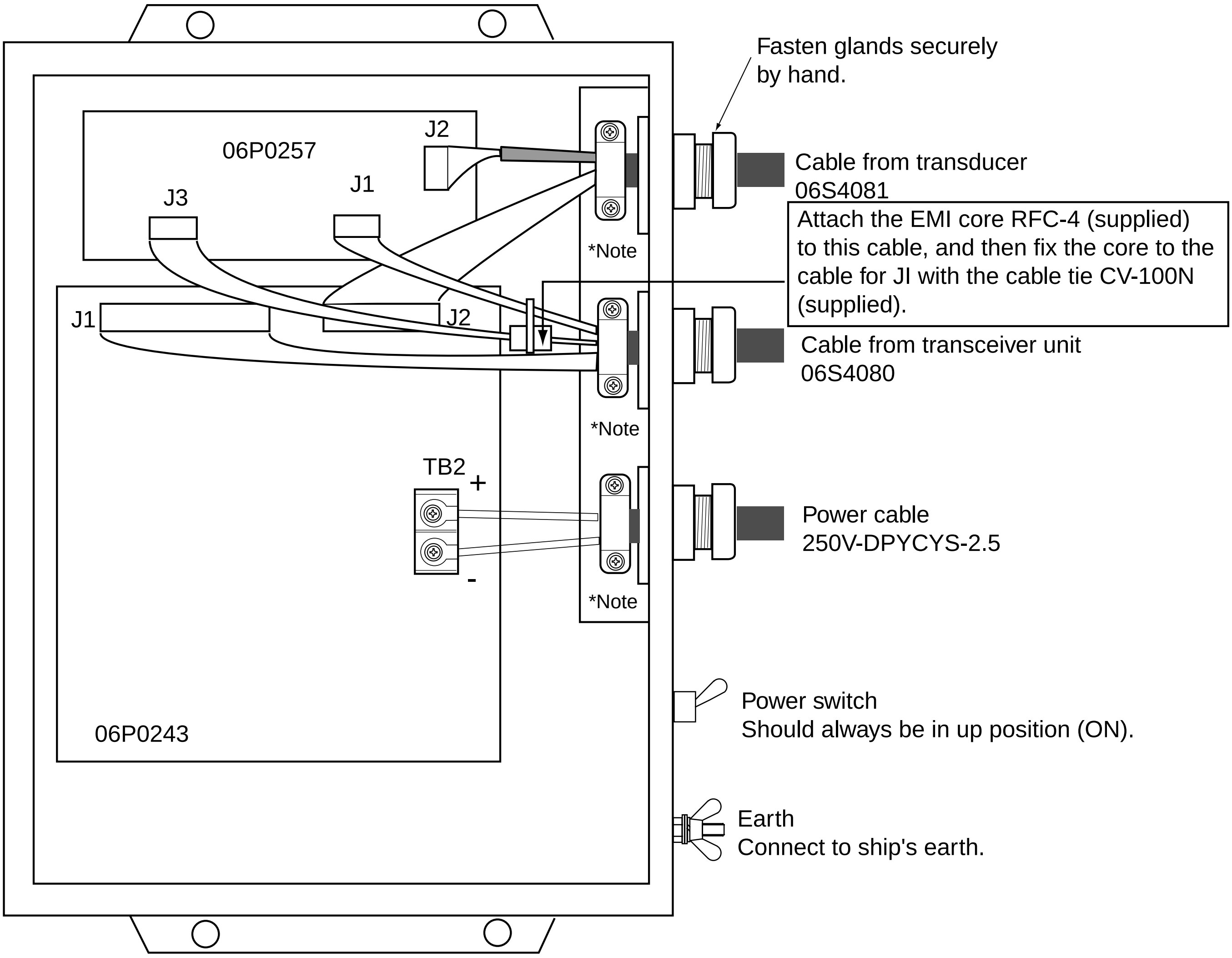
Note: Outputting KP of CH-300 to other sonar, echo sounder



Outputting KP of CH-300 to other sonar, echo sounder

2.3 Hull Unit

Pass the cables to the 06P0257 Board, through the cable protectors.



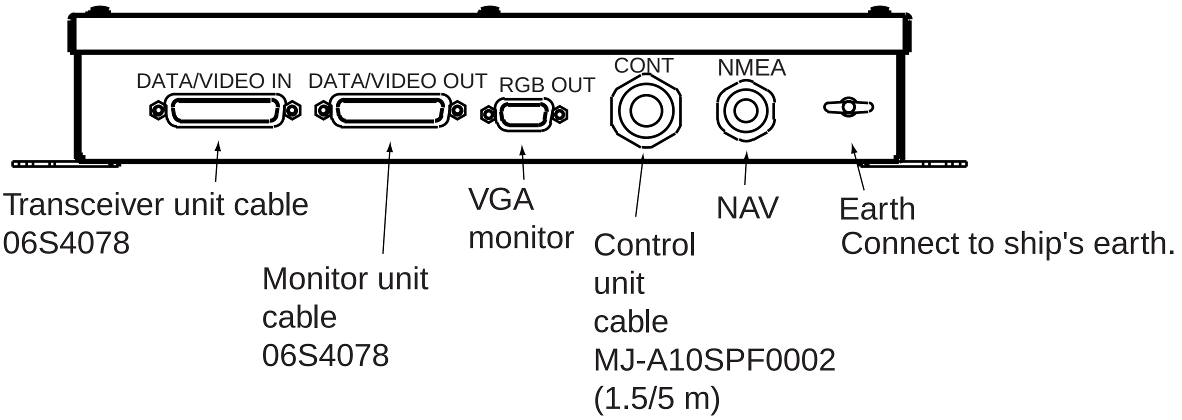
*Note: Fix the braided shield with cable clamp.

Hull unit, inside view



Attaching EMI core RFC-4

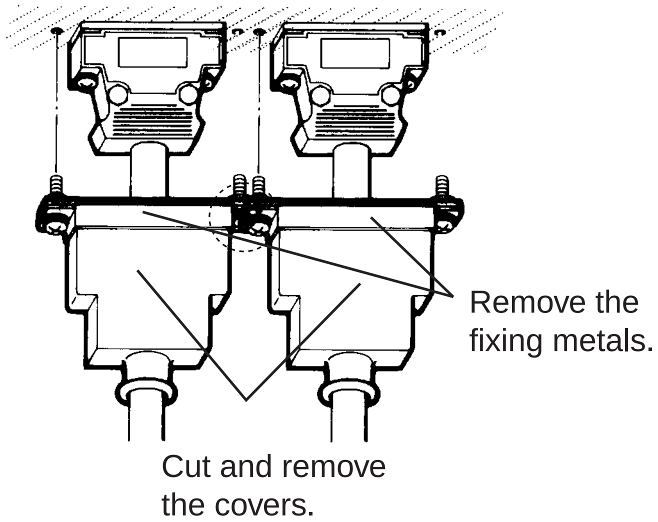
2.4 Interface Unit



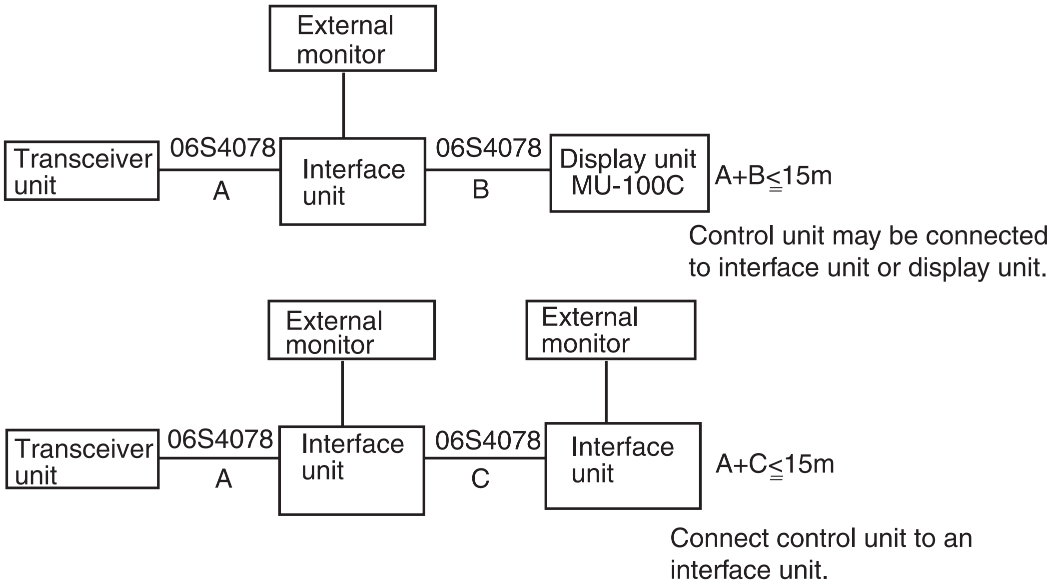
The blackbox type requires connection of a VGA monitor, via the interface unit IF-8000. Supply monitor and interconnection cable (Max. length 15 m with Dsub-15P connectors of male, three rows of 15 pins). The monitor used should satisfy the specifications shown below.

- VGA type
- ANALOG RGB 0.7 Vpp, positive polarity
- TTL level H, V, Negative polarity

Note 1: Two interface units can be connected to the transceiver unit in parallel.
Note 2: When using DATA/VIDEO OUT port, cut and remove the rubber covers as below to attach connectors to the interface unit.



Note 3: Connect control unit or navigator equipment to either interface unit or monitor unit (supplied by FURUNO).
Note 4: When connecting the monitor unit MU-100C to the interface unit, or two interface units in parallel to the transceiver unit, the length of cables should be as shown in the figure on next page. Note that two cables 06S4078 (10 m length) cannot be used.



2.5 I/O Sentences

Talkers may be chosen from among GP, LC, LA, DR, DE and other (II). Refer to “NAV DATA” in System Setting 1 menu.

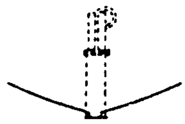
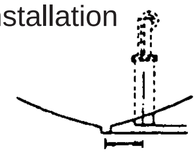
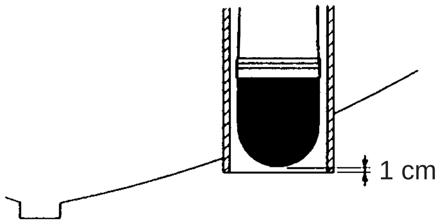
Available I/O sentences

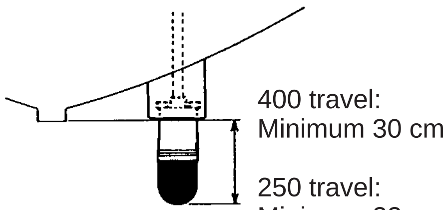
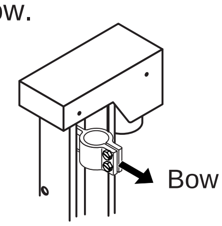
Sentences	I/O	Remarks
GLL	I	Geographic position, latitude/longitude
GGA	I	Global positioning system fix data
RMA	I	Recommended minimum specific LORAN-C data
RMC	I	Recommended minimum specific GPS/TRANSIT data
VTG	I	Course over ground and ground speed
VHW	I	Water speed and heading, any talker
HDG	I	Heading, magnetic, any talker
HDM	I	Heading, magnetic
HDT	I	Heading, true, any talker
VDR	I	Set and drift, any talker
DBS	I	Depth below surface, any talker
DBT	I	Depth below transducer, any talker, NMEA Version 1.5
DPT	I	Depth, any talker, NMEA Version 2.0
MTW	I	Water temperature, any talker
MDA	I	Water temperature, any talker
att	I	True heading, pitching, rolling, P sentence
TLL	O	Target latitude and longitude

3. ADJUSTMENTS

3.1 General Checks

General checks

<table>
<tr><th>Check Item</th><th>Check point, Rating</th></tr>
<tr><td rowspan="2">Retraction tank level</td><td>On-keel Installation
</td></tr>
<tr><td>Off-keel Installation

</td></tr>
<tr><td>Clearance between transducer and bottom of retraction tank when transducer is completely retracted by hand crank</td><td>
</td></tr>
<tr><td>Transducer travel
(lowered by hand clank)

Note: For checking purposes, a clearance of approximately 1 meter is required beneath the bottom of the transducer.</td><td>
</td></tr>
<tr><td>Transducer heading</td><td>Bow mark on the shaft sleeve should face to ship's bow.

</td></tr>
</table>

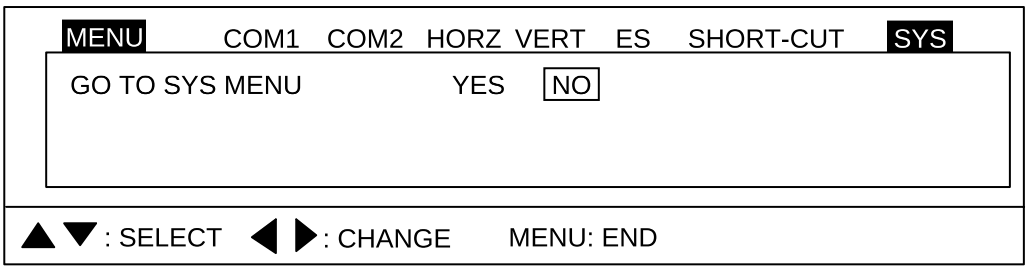
General checks (con't)

Check Item	Check point, Rating
Wiring check	All cables are correctly connected. All lead wires are tightly fixed with contact pins or crimp-on lugs. All screws are firmly fastened. Cables are firmly secured. Cable shields are properly grounded.
Rejecting source of noise and interference	Noise generating machinery (motor, radiotelephone, TV set, etc.) are not placed nearby. Magnetic devices are not placed in the vicinity of display unit.
Earth	Each unit is grounded with a copper strap.
Ship's mains voltage	Ship's mains voltage is stable 12 or 24 VDC.
Watertightness	Water should not leak from the main body flange or along the main shaft.

3.2 Checking TX Frequency

Check the TX frequency after installing the equipment.

1. Press the **MENU** key to open the menu.
2. Press the cursor pad to select SYS at the top of the menu display.
3. Press ▼ to select GO TO SYS MENU.



User menu (SYS)

4. Press ◀ to select YES to display the system menu.

```
** SYSTEM MENU **

SYSTEM SETTING ▶
RANGE-SONAR MODE
RANGE-VERTICAL MODE
RANGE-E/S MODE
RANGE-TRACK MODE
COLOR PALETTE
LANGUAGE
SYSTEM BACKUP
LOAD BACKUP DATA
HEADING OFFSET, DRAFT OFFSET
ADJ MOTION SENSOR
TX FREQ ADJUST
TEST
TEST PATTERN
DEMO MODE
DEFAULT

▲▼: SELECT ◀ ▶: MENU DISPLAY  MENU: END
```

System menu

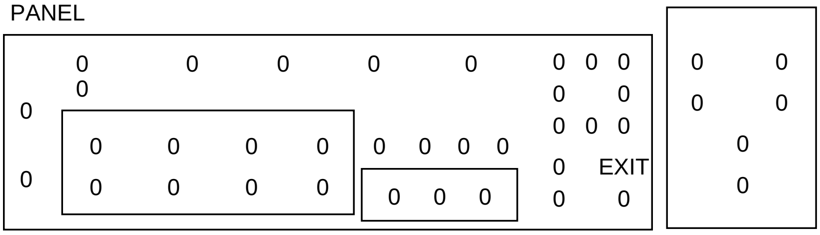
5. Press ▼ to select TEST.
6. Press ► to show the test display.

```
MAIN PROGRAM NO. 0650111-**.**
PANEL PROGRAM NO. 0650112-**.**
ROM              : OK
RAM              : OK
VRAM             : OK
NMEA 1           : OK
NMEA 2           : OK

TX FREQUENCY     : 85/215 kHz (or 60/153 kHz)
ROLL             MS: 10        SC: _ _ _
PITCH            MS: 10        SC: _ _ _

                 PULSES     NG
TRAIN              359       0

TEST COUNT=    :  0                          REMOTE CONTROL
PANEL
```



** Program Version No.

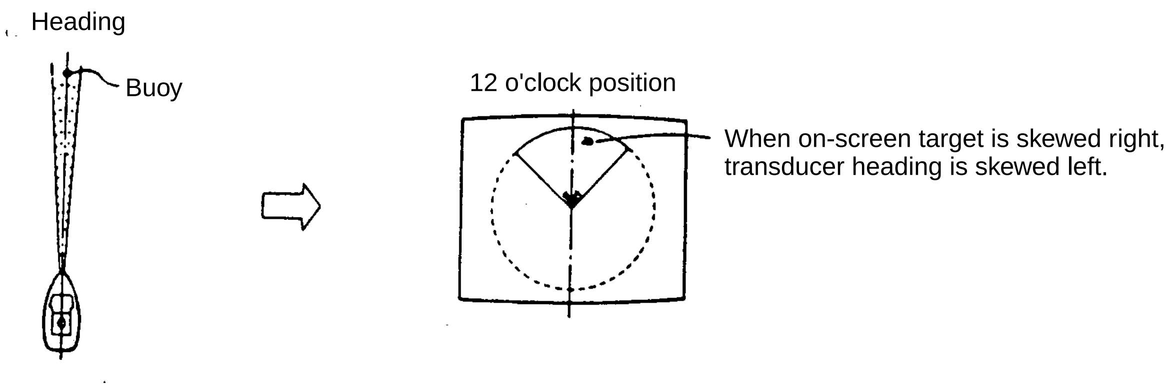
Test display

7. Check the frequency at the TX FREQUENCY line on the test display.
8. Press the **MENU** key several times to close the menu.

3.3 Heading Alignment Setting

The heading line can be compensated from the system menu (–180° to +180°).

1. Locate a target (buoy, etc.) in the bow direction and display it on the screen at close range, read deviation. The heading alignment is correct when the target is displayed at 12 o’clock on the screen.



Checking heading alignment

2. Press the **MENU** key to display the menu.
3. Press ◄ ► to select SYS at the top of menu display.
4. Press ▼ to select GO TO SYS.
5. Press ◄ to select YES to display the system menu.
6. Press ▼ to select HEADING OFFSET, DRAFT OFFSET, and then press ► to display the heading offset display.

** HEADING OFFSET/DRAFT OFFSET **

HEADING	:	0 °	(-180° - +180°)
DRAFT	:	0.0 °	(0.0 - 60.0m)

▲▼ : SELECT ◄ ► : CHANGE MENU: END

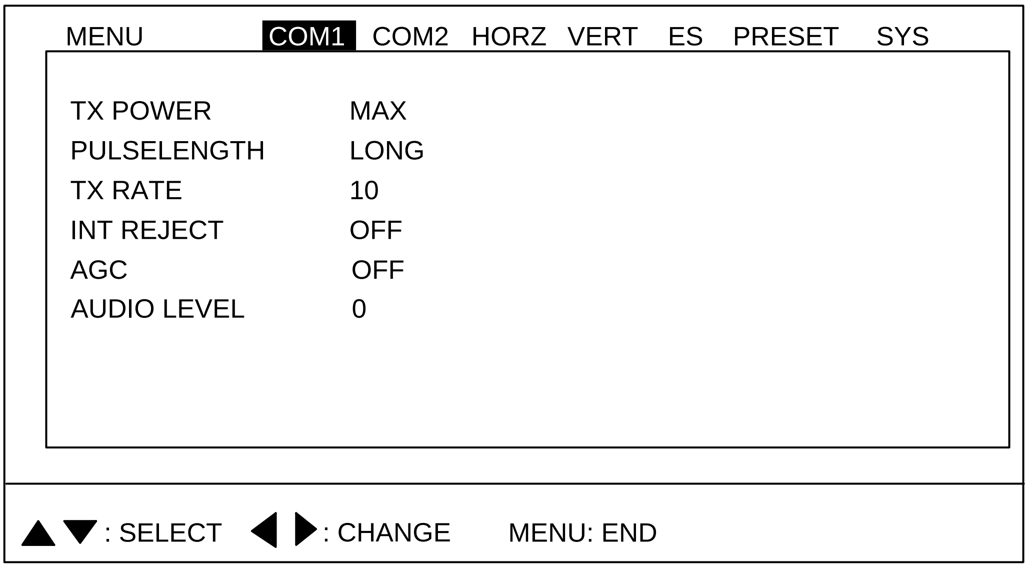
Heading offset display

7. Press ◄ or ► to align heading (1° step) so that the target selected at step 1 appears at the twelve o’clock position.
8. Press ▼ to choose DRAFT.
9. Press ◄ or ► to set ship’s draft.
10. Press the MENU key twice to close the menu.
11. Confirm that the target on heading direction appears at the twelve o’clock position.

3.4 Setting for Synchronizing Transmission with other Equipment

To synchronize transmission with other echo sounder (see paragraph 2.2), do as follows:

1. Press the **MENU** key to display the menu.
2. Press ◄ to select COM1 at the top of menu display.



Menu (COM1)

3. Press ▼ to select TX RATE.
4. Press ► to display the setting window.



TX RATE window

5. Press ◄ several times to select EXT.
6. Press the **MENU** key to close the menu.

3.5 Setting for Satellite Compass

FURUNO Satellite Compass SC-50/110 can be connected to feed rolling/pitching data to this equipment. Connect the SC-50/110 sensor to the NMEA/SATELLITE COMPASS port, and set up this port as below.

1. Press the **MENU** key to show the menu.
2. Press ► to select SYS at the top of menu display.
3. Press ▼ to select GO TO SYS MENU.
4. Press ◄ to select YES to display the system menu.
5. Press ▼ to select SYSTEM SETTING.

** SYSTEM SETTING 1 **

MENU 1 2

POSITION	:	SHIP'S L/L	SHIP'S LOP	CURSOR L/L			
TRACK	:	OFF	ON				
CURRENT DATA	:	OFF	FLOW FROM	FLOW TO			
HEADING INDICATION	:	TRUE	AZ				
NORTH MARK	:	OFF	ON				
CSE DATA	:	NAV	GYRO				
NAV DATA	:	GPS	LoranC	LoranA	DR	DECCA	OTHERS
NAV2 BAUDRATE	:	4800	9600	19200	38400		
TVG CORRECTION	:	OFF	1/2	1/1			
UNIT	:	m	ft	fa	HIRO	P/B	
TEMP	:	˚C	˚F				
TARGET L/L	:	OFF	ON				
CUSTOM KEY	:	PRESET KEY	SHORT-CUT KEY				
ETA MARK	:	OFF	10sec	30sec	1min	3min	6min

▲▼: SELECT ◄►: CHANGE MENU: END

System setting 1 menu

6. Press ▼ to select NAV 2 BAUDRATE, and then press ► to select 38400.
7. Press ▲ to select MENU at the top of the menu, and then press ► to select 2.

** SYSTEM SETTING 2 **

MENU : 1 2

GAIN SETTING PROTECT	: OFF	ON	
HORZ/HISTORY	: OFF	ON	
HORZ/VERT ZOOM	: OFF	ON	
HORZ/PLOTTER	: OFF	ON	
EMPHASIS MODE	: OFF	NORMAL	RED
STABILIZER	: OFF	MOTION SENSOR	SAT. COMPASS
AUTO RETRACTION	: OFF	(OFF, 5-15 kt)	
SPEED ALARM/MESSAGE	: OFF	ON	
SWEEP INDICATOR	: DOT	LINE	
DEFAULT SETTING	: NO	YES	

MAXIMUM ALLOWABLE SPEED IS 15 KNOTS WHILE SOUNDOME IS BEING RETRACTED. IF VESSEL HAS REPAID ACCELERATION CAPABILITIES, AUTO RETRACTION SETTINGS OF 10-12 KNOTS ARE MANDATORY TO AVOID CATASTROPHIC DAMAGE TO SOUNDOME ASSY. ANY PHISICAL DAMAGE TO THE SOUDOME ASSY. IS CONSIDERED ABUSE AND IS NOT A WARRANTY ISSUE.

▲▼: SELECT ◀▶: CHANGE MENU: END

System setting 2 menu

8. Press ▼ to select STABILIZER.
9. Press ► to select SAT. COMPASS.
10. Press the **MENU** key twice to close the menu.

Note: To output data from SC-50/110 in NMEA format, set the SC-50/110 as follows.

-Output format: IEC ed1

-Sentence: ATT (For others, set all OFF.)

-Baud rate: 38400 bps

-Cycle: 25 ms

(Talker : any)

Note: When connecting the analog signal of Satellite Compass SC-50/110 to the MOTION SENSOR port on the transceiver unit, choose MOTION SENSOR at step 9 in the above procedure. For wiring details, see the interconnection diagram at the back of this manual.

3.6 Setting of Motion Sensor/Satellite Compass

When connecting the motion sensor, clinometer or satellite compass, enter ship's roll and pitch angles as shown below. Note that the adjustment can be done only when connected to the MOTION SENSOR port. For the satellite compass, however, do not duplicate this adjustment; enter values at one location only.

1. Press the **MENU** key to display the user menu.
2. Press to ► select SYS at the top of the menu display.
3. Press ▼ to select GO TO SYS.
4. Press ◄ to select YES.
5. Press ▼ to select ADJ MOTION SENSOR, and then press ► to display the ADJ MOTION SENSOR menu.

```
** ADJ MOTION SENSOR **

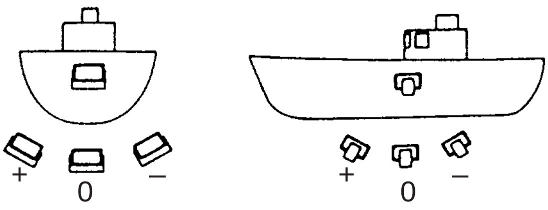
ROLL ANGLE:   0°   ADJ: +5* °   (-10° - +10°)
PITCH ANGLE:  0°   ADJ: +5* °   (-10° - +10°)

▲▼: SELECT   ◄►: CHANGE   MENU: END
```

*: For Clinometer BS-704, tilt angle is displayed. For Motion Sensor MS-100, the readout is "0" (zero) when the ship is stopped, regardress of actual roll or pitch.

Adj motion sensor menu

6. Press ▲ or ▼ to select ROLL ANGLE or PITCH ANGLE.
7. Press ◄ or ► to adjust (-10° to +10°).
8. For MS-100, use a clinometer or other similar measuring device to measure ship's semi-permanent inclination angle. Take the polarity of the angle. For example, if the stern is 3° down, set -3°.



	+	-
ROLL ANGLE	Starboard up	Starboard down
PITCH ANGLE	Stern up	Stern down

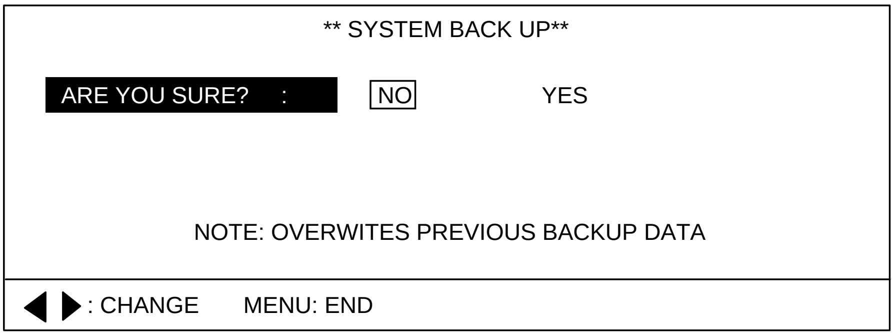
For clinometer BS-704, adjust so that the indication shows "0" (zero).

9. Press the **MENU** key several times to close the menu.

3.7 System Back Up

After setting up the equipment, follow the procedure below to back up system settings. Backup data can be loaded in the event of equipment trouble, to restore previous system settings.

1. Press the **MENU** key to display the user menu.
2. Press ► to select SYS at the top of the menu.
3. Press ▼ to select GO TO SYS MENU.
4. Press ◄ to select YES.
   The system menu appears.
5. Press ▼ to select SYSTEM BACKUP.
6. Press ► to display the system backup menu.



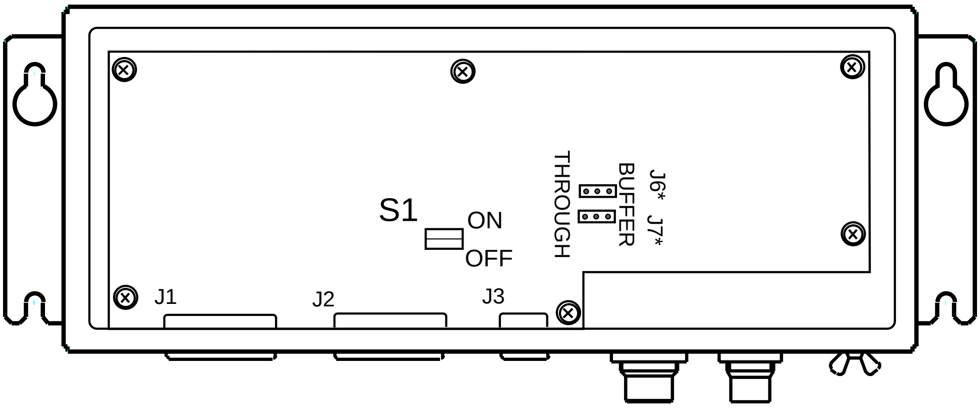
System backup menu

7. Press ► to select YES.
8. Press the **MENU** key to backup data.
   The backup data is saved, and then return to the System menu.
9. Press the **MENU** key to return to the normal display.

3.8 Setting of Interface Unit

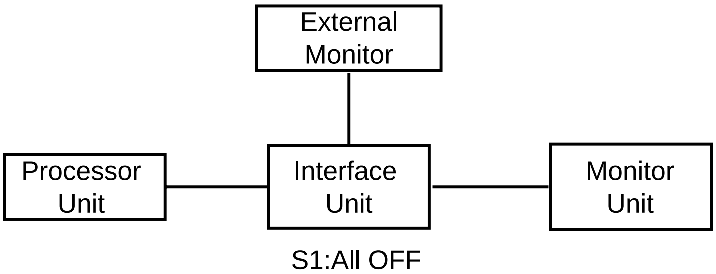
Set DIP switch S1 in the interface unit as follows.

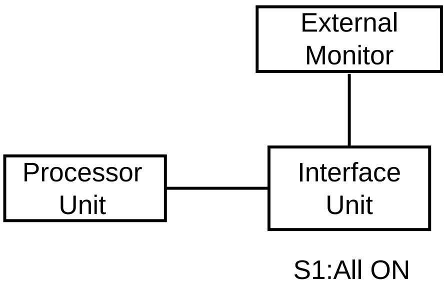
- A unit is connected to DATA/VIDEO OUT port of the interface unit : all OFF.
- Nothing is connected to DATA/VIDEO OUT port of the interface unit: all ON.

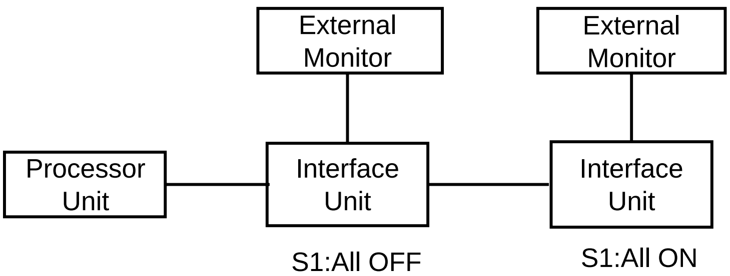


*: J6 and J7 set to "THROUGH" side.

Interface unit, DIP switch S1 location





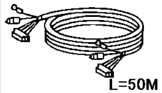
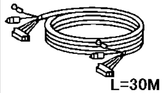
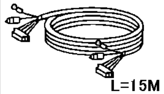
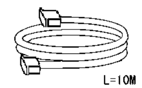
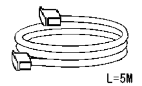


FURUNO

CODE NO.		06AS-X-9402 -2
TYPE		1/1

工事材料表
INSTALLATION MATERIALS

CH-250/250S、CH-300

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ケーブル組品 CABLE ASSY.		06S4080 *50M*		1	選択 TO BE SELECTED
			CODE NO.	000-142-909		
2	ケーブル組品 CABLE ASSY.		06S4080 *30M*		1	選択 TO BE SELECTED
			CODE NO.	000-142-908		
3	ケーブル組品 CABLE ASSY.		06S4080 *15M*		1	選択 TO BE SELECTED
			CODE NO.	000-142-907		
4	ケーブル組品 CABLE ASSY.		06S4078 *10M*		1	選択 TO BE SELECTED
			CODE NO.	000-142-900		
5	ケーブル組品 CABLE ASSY.		06S4078 *5M*		1	選択 TO BE SELECTED
			CODE NO.	000-142-902		

06AS-X-9402

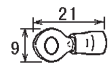
FURUNO ELECTRIC CO., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	006-556-630	06AS-X-9401 -1
TYPE	CP06-01251	1/1

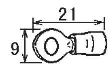
工事材料表
INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	圧着端子 CRIMP-ON LUG		FV2-4 ｱｵ		8	
			CODE NO.	000-538-118		

FURUNO

CODE NO.	006-562-580	06AS-X-9404 -0
TYPE	CP06-01261	1/1

工事材料表
INSTALLATION MATERIALS

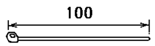
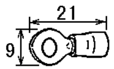
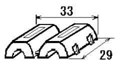
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	圧着端子 CRIMP-ON LUG		FV2-4 ｱｵ		4	
			CODE NO.	000-538-118		

FURUNO

CODE NO.	006-561-620-00	06AV-X-9401 -3
TYPE	CP06-01501	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ｺﾝﾍﾞｯｸｽ PLASTIC BAND		CV-100N CV-100N CODE NO. 000-162-167-10 000-570-322-00	2	
2	圧着端子 CRIMP-ON LUG		FV2-4 ｱｵ CODE NO. 000-538-118-00	4	
3	EMIｺｱ EMI CORE		RFC-4 RFC-4 CODE NO. 000-161-849-10 000-152-697-00	1	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

06AV-X-9401

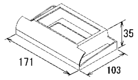
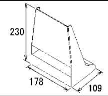
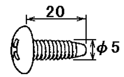
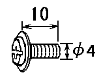
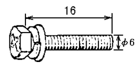
FURUNO ELECTRIC CO ., LTD

FURUNO

CODE NO.	001-413-590-00	02FJ-X-9508 -2
TYPE	FP02-05101	1/1

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾄﾘﾂｹﾀﾞｲ MOUNTING BASE		02-127-1301-1 CODE NO. 100-285-141-00	1	
2	ﾊﾝｶﾞｰ BRACKET		02-127-1302-1 CODE NO. 100-285-151-00	1	
3	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
4	＋ﾊﾞｲﾝﾄﾞｾﾑｽF WASHER BINDING HEAD SCREW		M4X10 C2700W MBCR2 ﾋﾗ CODE NO. 000-163-543-10	4	
5	+ｱﾌﾟｾｯﾄUIｾﾑｽB +HEX.BOLT		M6X16 SUS304 CODE NO. 000-800-420-00	2	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

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（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO ELECTRIC CO ., LTD.

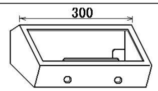
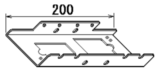
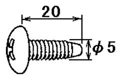
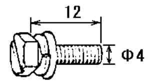
02FJ-X-9508

FURUNO

CODE NO.	006-556-260-00	06AS-X-9501 -7
TYPE	FP06-01120	1/1

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	操作取付台 ONTROL UNIT MOUNTING BASE		06-021-2111-1 CODE NO. 100-279-741-10	1	
2	ｿｳｻﾌﾞﾗｹｯﾄ CONTROL UNIT BRACKET		06-021-2112-0 ROHS CODE NO. 100-281-880-10	1	
3	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	2	
4	ﾎｰﾙﾌﾟﾗｸﾞ COSMETIC PLUG		DP-687 ｸﾛ CODE NO. 000-165-997-10	2	
5	六角ｽﾘﾜﾘ ｾﾑｽB HEX.BOLT (SLOTTED,WASHER HEAD)		M4X12 SUS304 CODE NO. 000-162-939-10	4	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

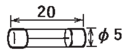
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO ELECTRIC CO., LTD.　　06AS-X-9501

FURUNO

CODE NO.	006-556-200	06AS-X-9301 -4 1/1
TYPE	SP06-01101	BOX NO. P

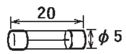
SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGMB 125V 3A PBF	1		3	000-157-481

FURUNO

CODE NO.	006-556-210	06AS-X-9302 -2 1/1
TYPE	SP06-01102	BOX NO. P

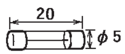
SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGMB 125V 10A PBF			3	000-157-470

FURUNO

CODE NO.	006-558-990	06AS-X-9304 -2 1/1
TYPE	SP06-01103	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGMB 125V 7A PBF FGMB 7A 125V	1		3	000-157-493-10 000-105-868-00

FURUNO

CODE NO.	006-556-220	06AS-X-9303 -4 1/1
TYPE	SP06-01111	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	PER VES	SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE	20, φ5	FGMB 125V 0.2A PBF			3	000-157-457-10
			FGMB 0.2A 125V				000-121-723-00

FURUNO

CODE NO.	006-557-810	06AV-X-9404 -1
TYPE	CH-2543	1/1

フランジ組部品

FLANGE ASSEMBLING PARTS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	架台載せ台 FLANGE ASSEMBLY	343	06-021-4020-2	CODE NO. 100-280-372	1	
2	グリスコットン GREASE COTTON	10, L=0.6M	#7061 9.5ｶｸ*0.6M*	CODE NO. 000-802-851	1	架台載せ台に装着 PRE-ATTACHED TO FLANGE ASSY.
3	トラニオンピン TRUNNION PIN	104, φ16	06-021-4022-2	CODE NO. 100-280-392	1	架台載せ台に装着 PRE-ATTACHED TO FLANGE ASSY.
4	グリスコットン押え台 COTTON RETAINER	φ63	06-021-4023-0	CODE NO. 100-295-460	1	架台載せ台に装着 PRE-ATTACHED TO FLANGE ASSY.
5	フランジブッシュ FLANGE BUSH	φ18	80F-1615	CODE NO. 000-808-925	2	架台載せ台に装着 PRE-ATTACHED TO FLANGE ASSY.
6	フランジパッキン GASKET	φ297, t=2	SHJ-0009-1	CODE NO. 661-000-091	1	架台載せ台に装着 PRE-ATTACHED TO FLANGE ASSY.
7	グリスコットンハリマーク LABEL FOR GREASE COTTON	150, 47	SHN-0023-0	CODE NO. 661-400-230	1	架台載せ台に装着 PRE-ATTACHED TO FLANGE ASSY.

06AV-X-9404

FURUNO ELECTRIC CO., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	006-546-220-00	06AV-X-9403 -6
TYPE	CH-2544	1/2

現地組部品
LOCAL ASSEMBLING PARTS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	CODE NO.	数量 Q'TY	用途／備考 REMARKS
1	パイプキャップ PIPE CAP	35, φ44	SHN-0011-1 ROHS	661-400-111-10	1	
2	ジュビリークリップ FASTENING BAND	13	1X 28-41 SUS304	000-801-857-00	1	
3	六角ボルト HEX. BOLT	35, φ10	M10X35 SUS304	000-162-786-10	2	
4	Uナット U-NUT	14	M10 SUS	000-863-930-00	2	
5	ミガキ平座金 FLAT WASHER	φ21	M10 SUS304 M10 SUS304	000-167-232-10 000-864-131-00	4	
6	タンクガイド組品 TANKGUIDE ASSEMBLY	154	CH-2544	006-546-730-00	1	
7	六角ボルト 全ネジ HEX. BOLT	80, φ20	M20X80 SUS304	000-162-826-10	8	
8	六角ナット 1種 HEX. NUT	16, 30	M20 SUS304	000-863-116-00	16	
9	ミガキ平座金 FLAT WASHER	φ40	M20 SUS304	000-864-136-00	16	
10	バネ座金 SPRING WASHER	34	M20 SUS304	000-864-270-00	8	

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
型式/コード番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。
TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

CODE NO.	006-546-220-00	06AV-X-9403 -6
TYPE	CH-2544	2/2

現地組部品
LOCAL ASSEMBLING PARTS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	CODE NO.	数量 Q'TY	用途／備考 REMARKS
11	キノラスタ ANTI CORROSIVE SEALANT	φ54, 35, KINORUSTER	855 *50Gイリ*	000-165-728-10	1	
12	エキジョウガスケット LIQUID GASKETS	225, 50, 40	TB1194 200G	000-164-260-10	1	
13	セメダインハイスーパー CEMEDINE HIGH SUPER	80, 32, 15	6Gセット	000-856-520-00	1	
14	ボールレンチ BALL WRENCH	135, 25	TWB-40	000-162-561-10	1	
15	シム(0.5) SHIM	39, 9, T=0.5	06-021-4035-0	100-295-420-10	4	
16	シム(1.0) SHIM	39, 9, T=1	06-021-4036-0	100-295-430-10	2	
17	シム(2.0) SHIM	39, 9, T=2	06-021-4037-0	100-295-440-10	4	
18	セメダイン塗布要領書 APPLYING ADHESIVE	210, 297	J19-80010-*	000-809-044-1*	1	

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
型式/コード番号が２段の場合、下段より上段に代わる過渡期品でどちらかが入っています。 なお、品質は変わりません。
TOW TYPES AND CODES MAY BE LISTED. THE BOTTOM PRODCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT. QUALITY THE SAME.

FURUNO

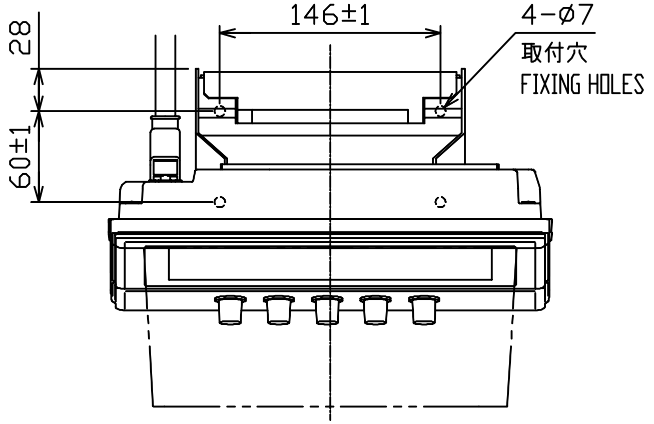
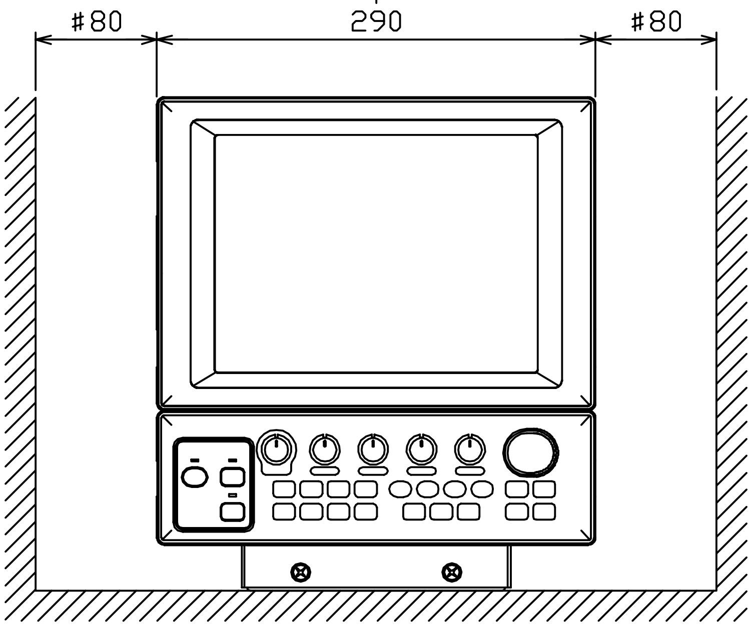
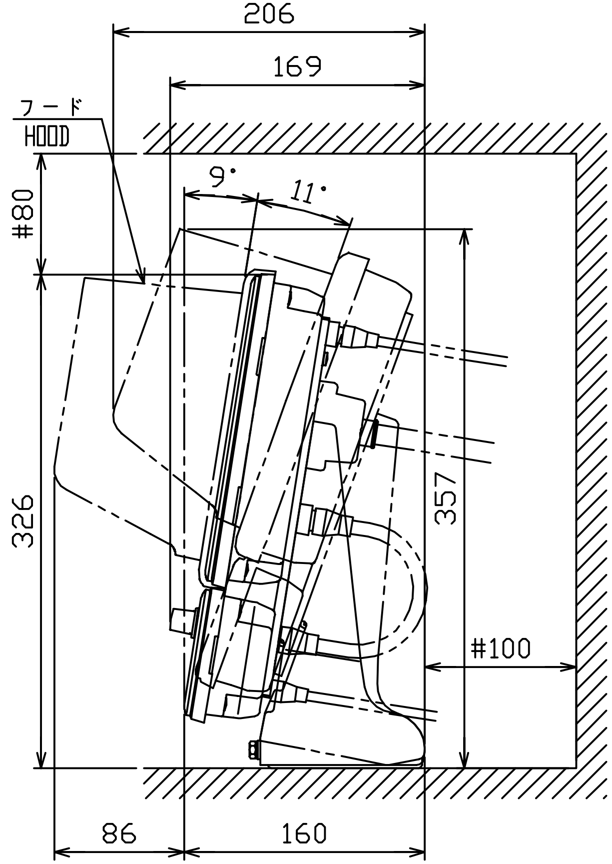
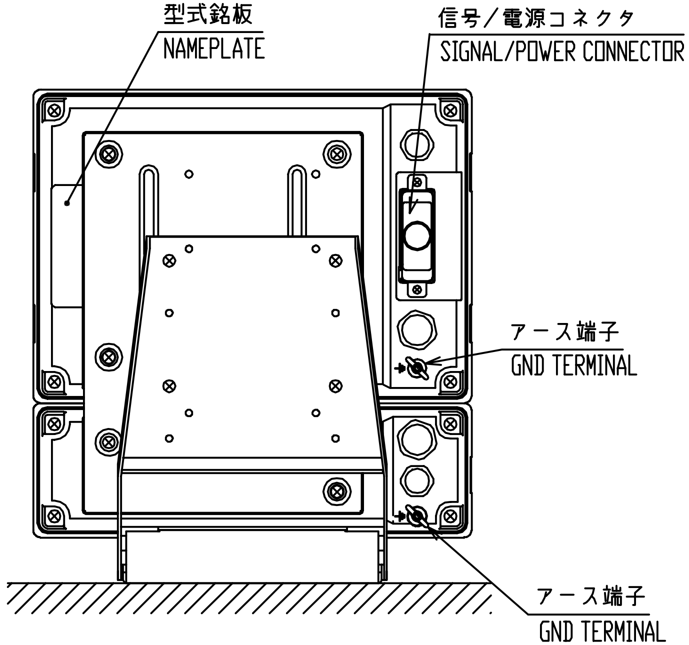


表 1 TABLE 1

寸法区分（ｍｍ） DIMENSIONS	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０＜Ｌ≦１００	±２．５
１００＜Ｌ≦５００	±３







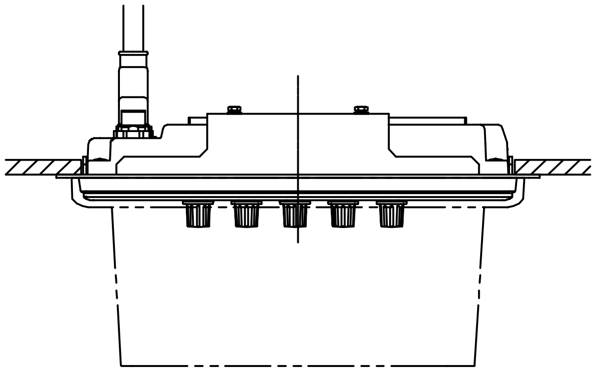
注 記　１）＃印寸法は最小サービス空間寸法とする。
２）指定外の寸法公差は表１による。
３）取付用ネジは＋トラスタッピンネジ呼び径5x20を使用のこと。
４）装備ケーブルはサービス時、本体を前方に十分引出せるよう余裕を持たせること。

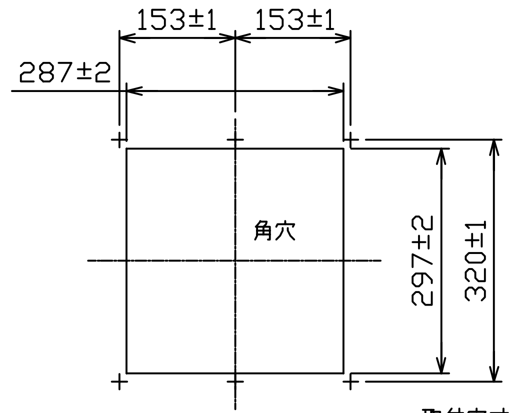
NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.

DRAWN Feb. 4, '05 E. MIYOSHI		TITLE	CH-302/MU-100C
CHECKED TAKAHASHI. T		名称	操作／表示部（卓上装備）
APPROVED Y. Hatai			外寸図
SCALE 1/5	MASS 5.7 ±10% kg	NAME	CONTROL/MONITOR UNIT (TABLETOP MOUNT)
DWG.No. C1325-G01- A	06-030-190G- 0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO





取付穴寸法図　尺度１／１０

CUTOUT DIMENSIONS (SCALE 1/10)

注 記

1）＃印寸法は最小サービス空間寸法とする。

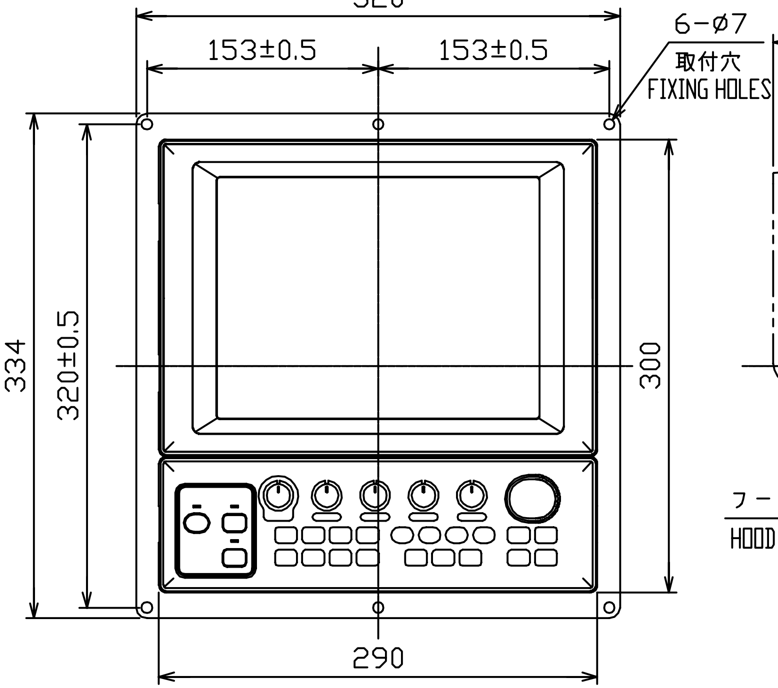
2）指定外の寸法公差は表１による。

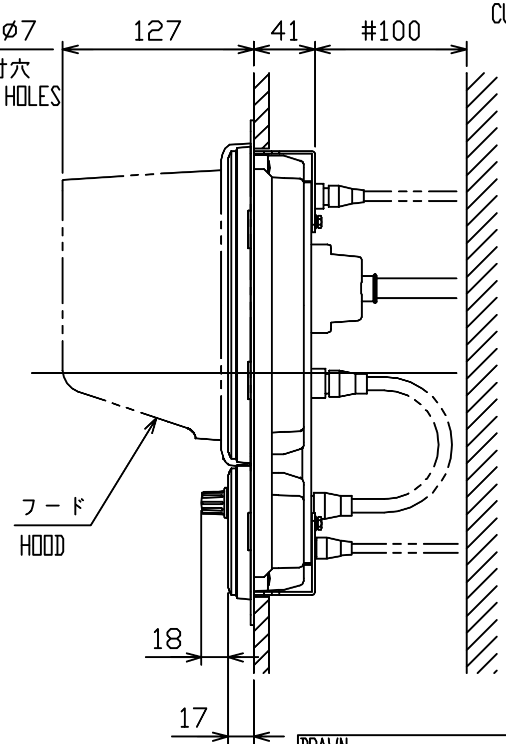
3）取付用ネジは＋トラスタッピンネジ呼び径5x20を使用のこと。

4）装備ケーブルはサービス時、本体を前方に十分引出せるよう余裕を持たせること。

NOTE

1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.





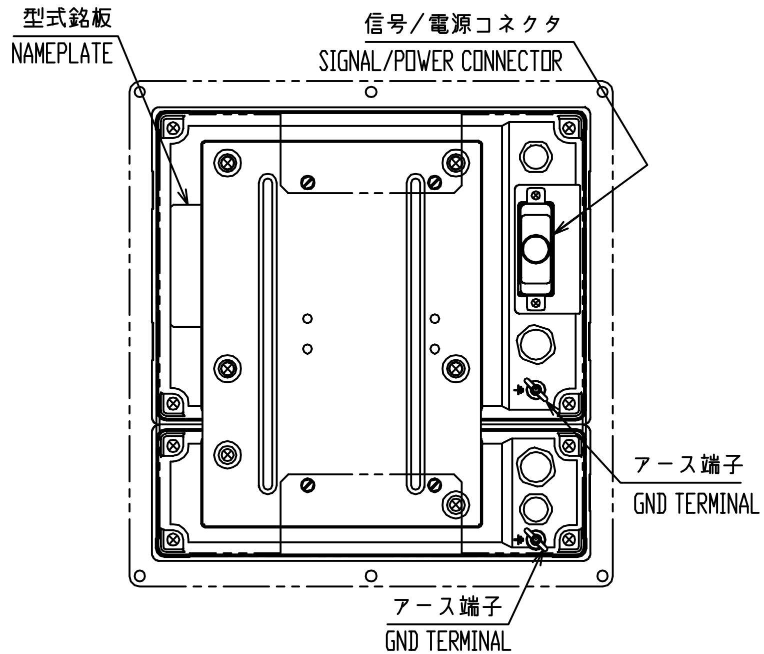


表 1 TABLE 1

寸法区分（ｍｍ） DIMENSIONS	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０＜Ｌ≦１００	±２．５
１００＜Ｌ≦５００	±３

DRAWN	Feb. 2, '05 E. MIYOSHI	TITLE	CH-302/MU-100C
CHECKED	TAKAHASHI. T	名称	操作／表示部（埋込装備）
APPROVED	Y. Hatai		外寸図
SCALE	1/5 MASS $4.2^{\pm 10\%}$ kg	NAME	CONTROL/MONITOR UNIT (FLUSH MOUNT)
DWG.No.	C1325-G02- A　06-030-190G- 0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

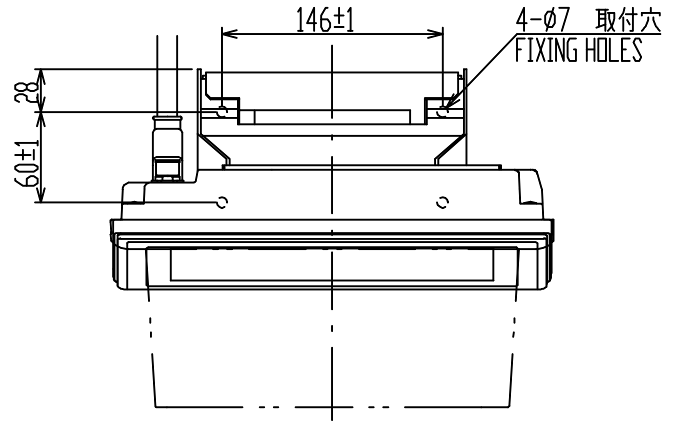
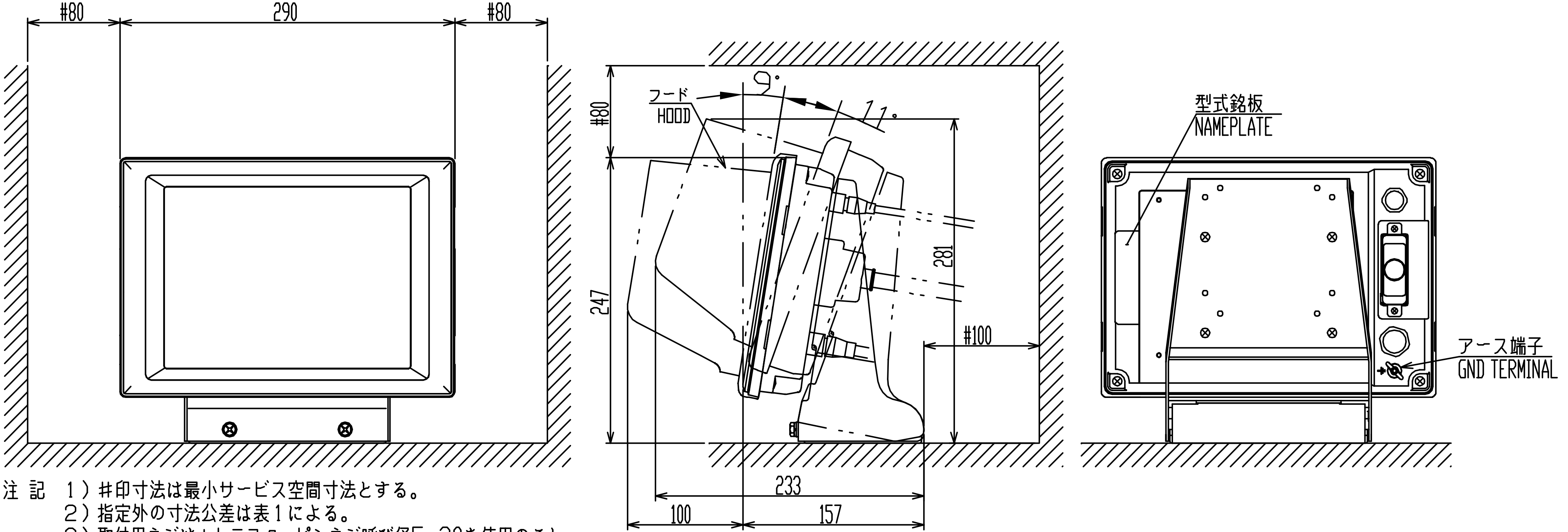


表 1 TABLE 1

寸法区分（mm） DIMENSIONS	公差（mm） TOLERANCE
0 ＜ L ≦ 50	±1．5
50 ＜ L ≦ 100	±2．5
100 ＜ L ≦ 500	±3



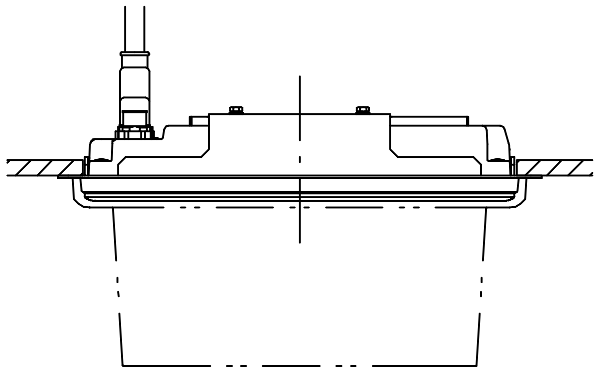
注 記 1）#印寸法は最小サービス空間寸法とする。
2）指定外の寸法公差は表１による。
3）取付用ネジは＋トラスタッピンネジ呼び径5×20を使用のこと。
4）装備ケーブルはサービス時、本体を前方に十分引出せるよう余裕を持たせること。

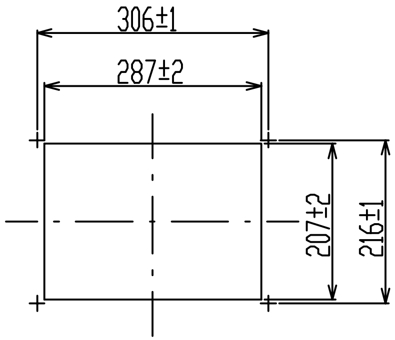
NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.

DRAWN Dec. 15, '04 E.MIYOSHI		TITLE	MU-100C
CHECKED TAKAHASHI. T	CH-300	名称	表示部（分離型、卓上装備）
APPROVED Y. Hatai	CH-250/S		外寸図
SCALE 1/5 MASS $4.2^{+10\%}_{-}$ kg		NAME	MONITOR UNIT (SEPARATE, TABLETOP MOUNT)
DWG.No. C1316-G08- D	06-021-191G- 2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

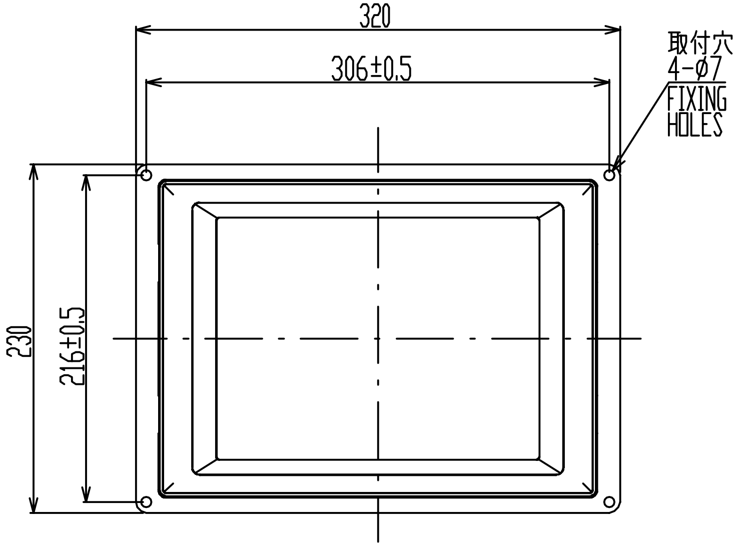


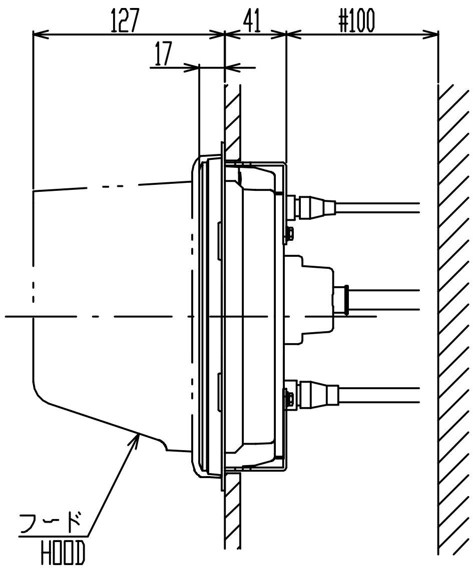


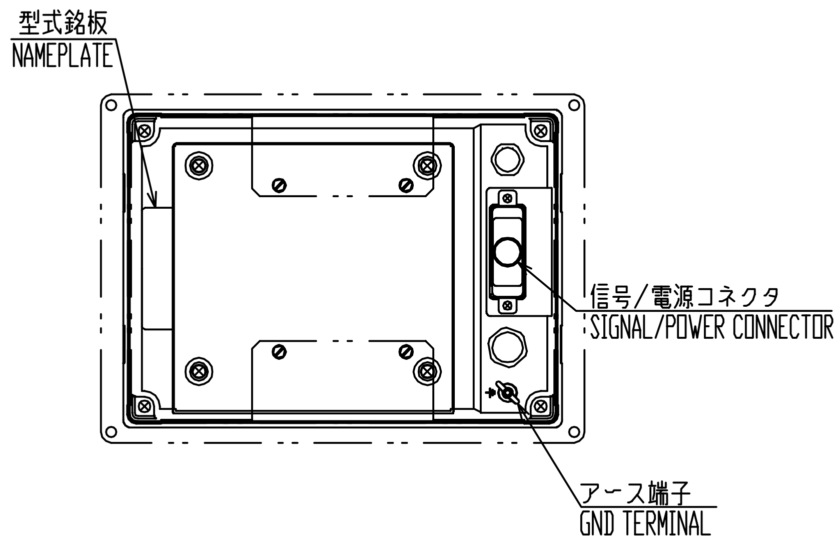
取付穴寸法図　尺度1/10
CUTOUT DIMENSIONS (SCALE 1/10)

表 1　TABLE 1

寸法区分（mm） DIMENSIONS	公差（mm） TOLERANCE
0 ＜ L ≦ 50	±１．５
50 ＜ L ≦ 100	±２．５
100 ＜ L ≦ 500	±３





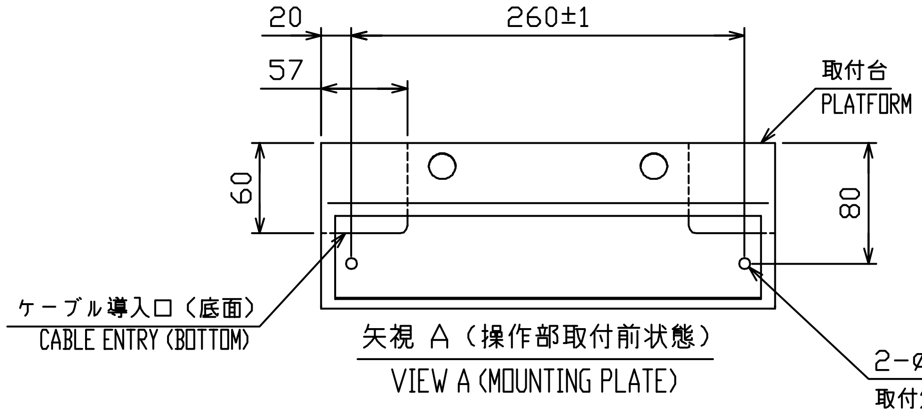


注 記　１）＃印寸法は最小サービス空間寸法とする。
２）指定外の寸法公差は表１による。
３）取付用ネジは＋トラスタッピンネジ呼び径5x20を使用のこと。
４）装備ケーブルはサービス時、本体を前方に十分引出せるよう余裕を持たせること。

NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.

DRAWN	Apr. 12, '05　E.MIYOSHI		TITLE	MU-100C
CHECKED	TAKAHASHI. T	CH-300	名称	表示部（分離型、埋込装備）
APPROVED	Y. Hatai	CH-250/S		外寸図
SCALE	1/5　MASS $3.0^{\pm 10\%}$ kg		NAME	MONITOR UNIT (SEPARATE, FLUSH MOUNT)
DWG.No.	C1316-G10- B	06-021-1930-G0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



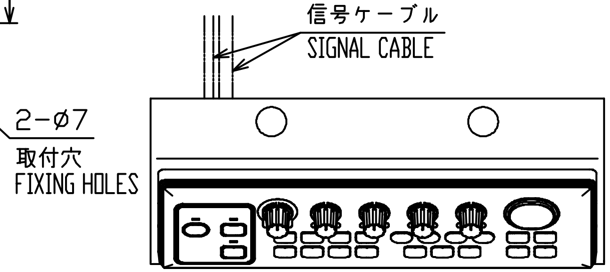
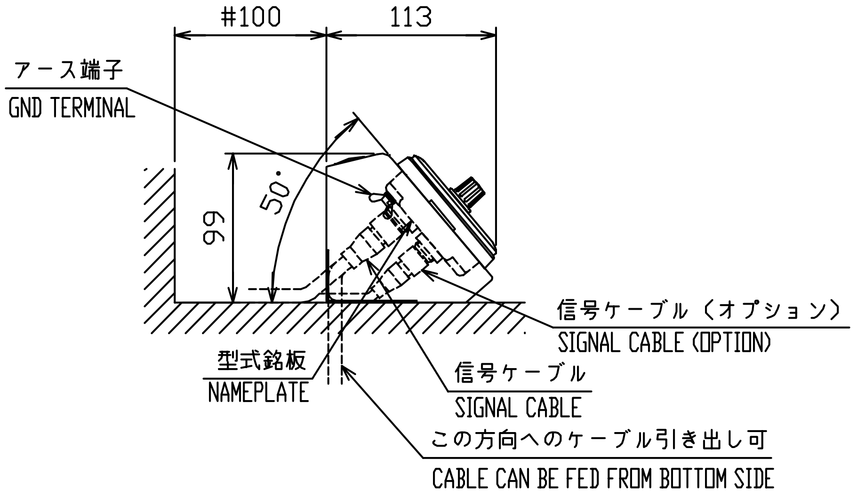
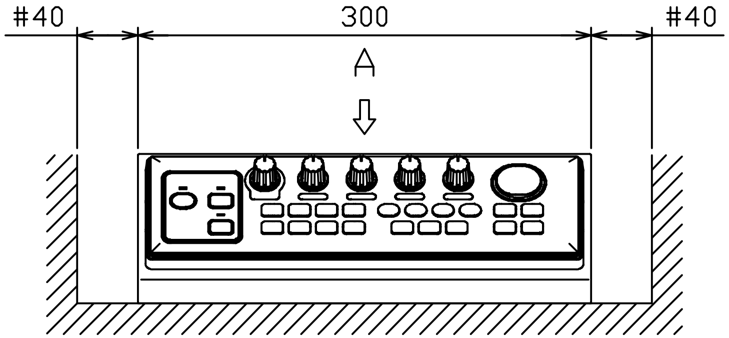


表 1 TABLE 1

寸法区分（mm） DIMENSIONS	公差（m·m） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3





NOTE

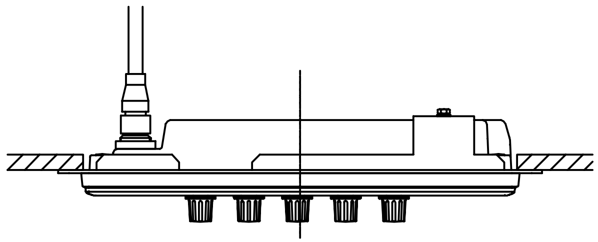
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.

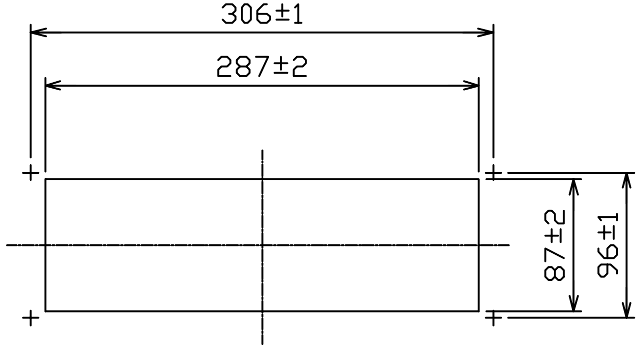
注 記

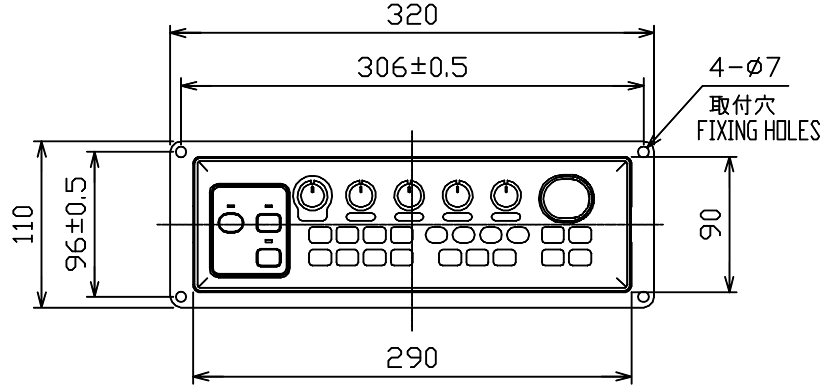
1） #印寸法は最小サービス空間寸法とする。
2） 指定外の寸法公差は表1による。
3） 取付用ネジは＋トラスタッピングネジ呼び径５ｘ２０を使用のこと
4） 装備ケーブルはサービス時、本体を前方に十分引き出せるよう余裕を持たせること。

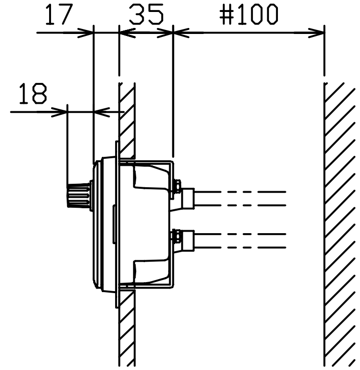
DRAWN Apr. 13, '05 E. MIYOSHI		TITLE CH-302
CHECKED TAKAHASHI. T		名称 操作部 （卓上装備）
APPROVED Y. Hatai	CH-300	外寸図
SCALE 1/5 MASS 1.6 kg ±10%		NAME CONTROL UNIT (TABLETOP MOUNT)
DWG.No. C1325-G03- A	06-030-200G-0	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.









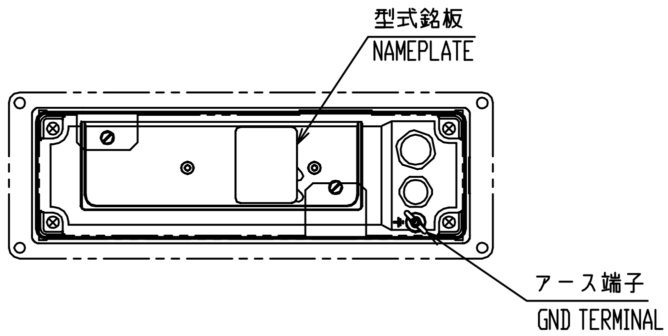


表 1 TABLE 1

寸法区分（ｍｍ） DIMENSIONS	公差（m m） TOLERANCE
Ｌ≦５０	±１．５
５０＜Ｌ≦１００	±２．５
１００＜Ｌ≦５００	±３

注 記

１） ＃印寸法は最小サービス空間寸法とする。
２） 指定外の寸法公差は表１による。
３） 取付用ネジは＋トラスタッピンネジ呼び径５ｘ２０を使用のこと
４） 装備ケーブルはサービス時、本体を前方に十分引き出せるよう余裕を持たせること。

NOTE

1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.

DRAWN	Apr. 12, '05 E. MIYOSHI	TITLE	CH-302
CHECKED	TAKAHASHI. T	名称	操作部 （埋込装備）
APPROVED	Y. Hatai	CH-300	外寸図
SCALE	1/5 MASS 1.1 kg ±10%	NAME	CONTROL UNIT (FLUSH MOUNT)
DWG.No.	C1325-G04- A	06-030-290G-0	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

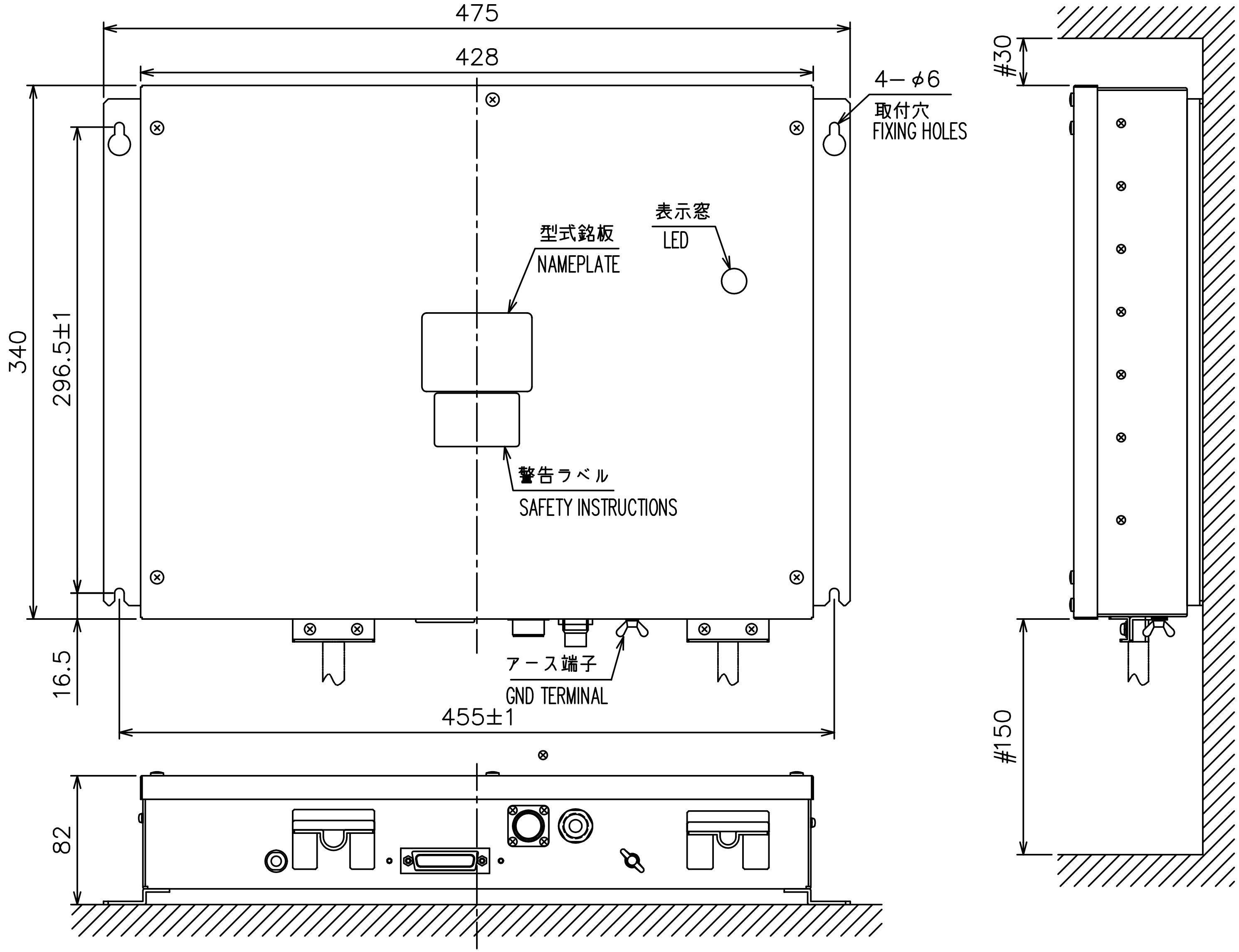


表 1 TABLE 1

寸法区分（ｍｍ） DIMENSIONS	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０＜Ｌ≦１００	±２．５
１００＜Ｌ≦５００	±３

注　記　1）　＃印寸法は最小サービス空間寸法とする。
　　　　2）　指定外の寸法公差は表１による。

NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN	Apr. 13, '05 E. MIYOSHI	TITLE	CH-303
CHECKED	TAKAHASHI. T	名称	送受信装置 外寸図
APPROVED	Y. Hatai	NAME	TRANSCEIVER UNIT OUTLINE DRAWING
SCALE	1/4 MASS 3.5 ±10% kg		
DWG.No.	C1325-G05- A		06-030-300G-1

FURUNO ELECTRIC CO., LTD.

FURUNO

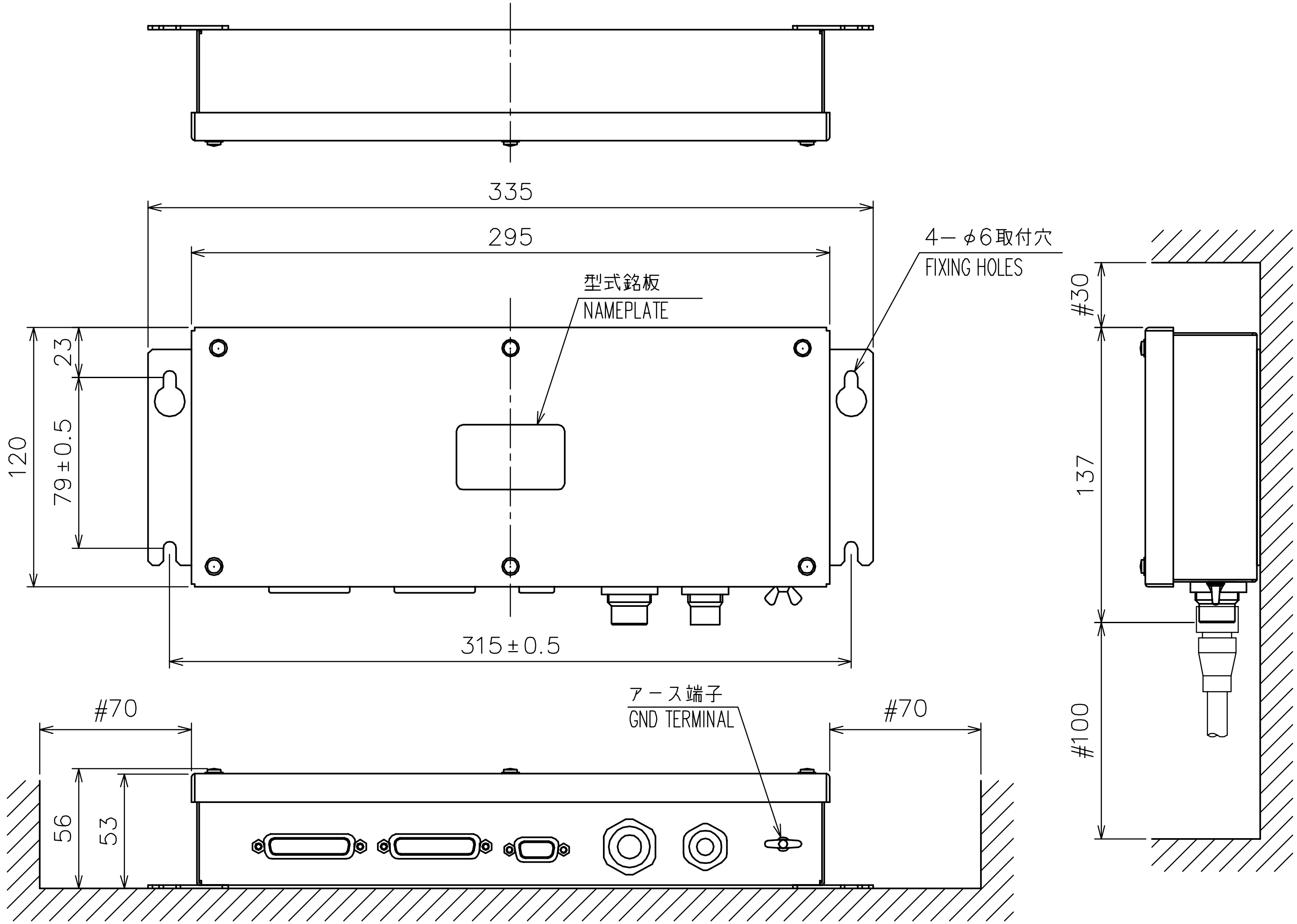


表 1 TABLE1

寸法区分（mm） DIMENSIONS	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

注　記　1） #印寸法は最小サービス空間寸法とする。

2） 指定外の寸法公差は表１による。

3） 取付用ネジは＋トラスタッピンネジ呼び径4x16を使用のこと。

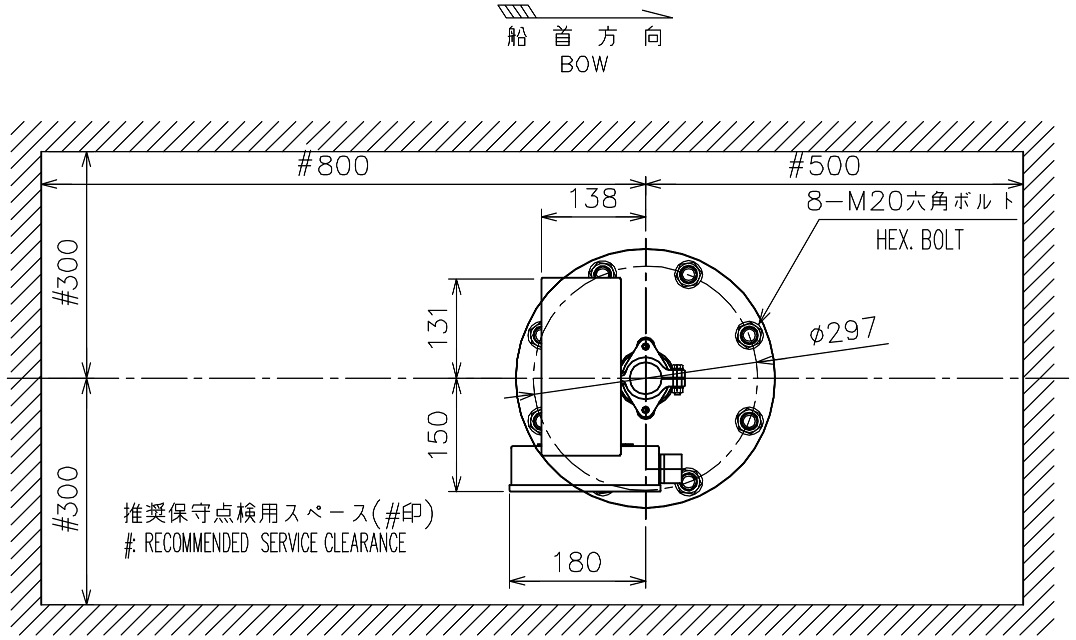
NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 4x16 FOR FIXING THE UNIT.

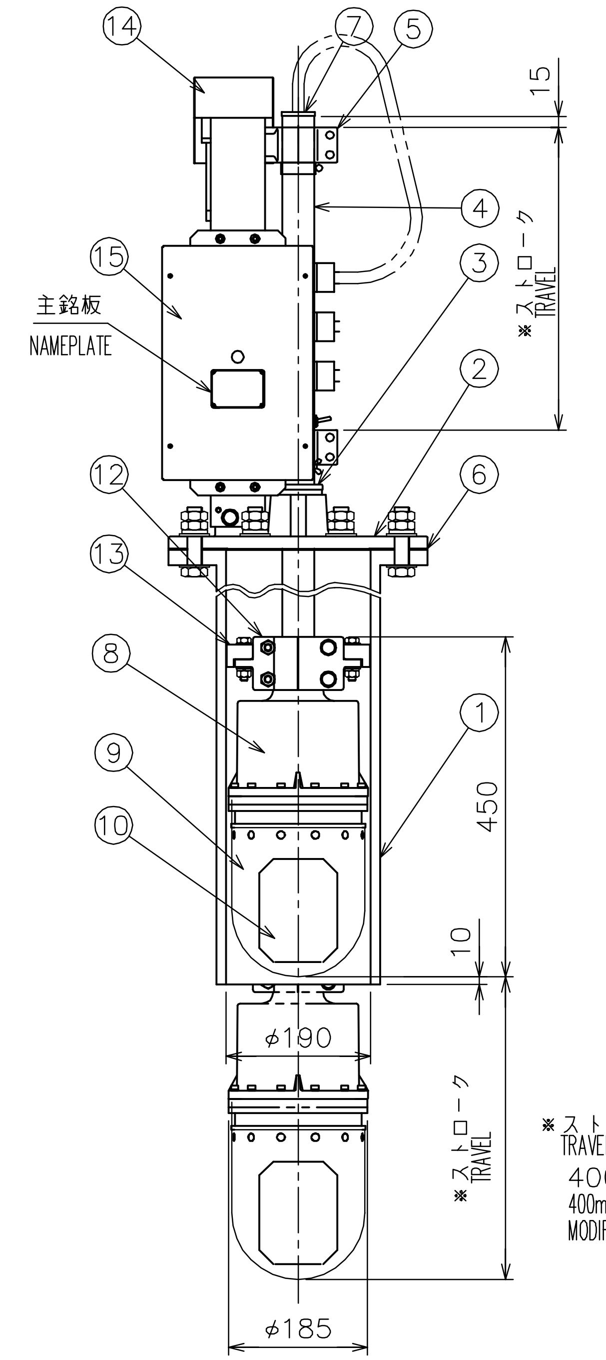
DRAWN	Mar. 23, '06 E. MIYOSHI	TITLE	IF-8000
CHECKED	TAKAHASHI. T	名称	インターフェイスユニット
APPROVED	Y. Hatai	CH-250	外寸図
SCALE 1/3	MASS 1.1 ±10% kg	NAME	INTERFACE UNIT
DWG.No. C1316-G07- C	REF.No. 06-021-500G-3		OUTLINE DRAWING

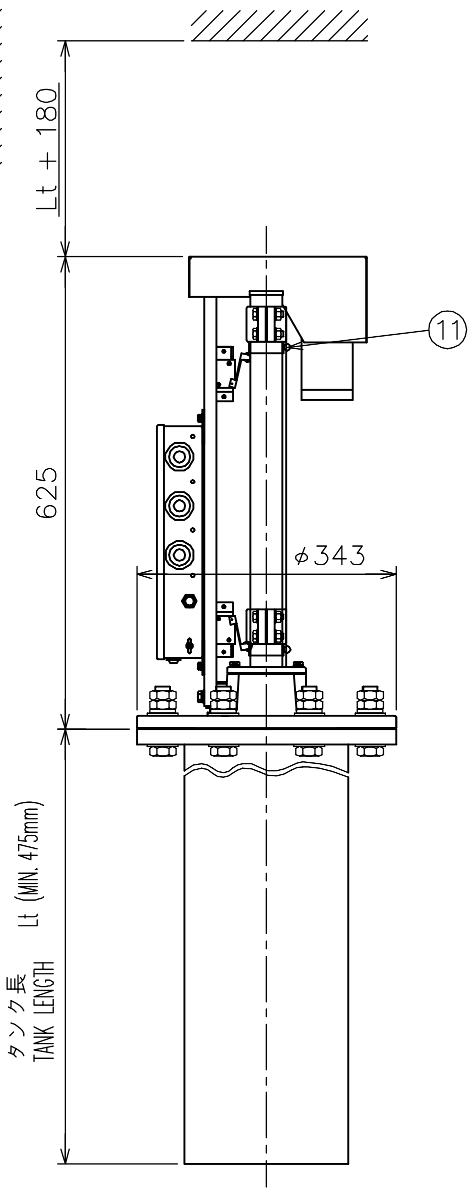
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図番







※ストローク
TRAVEL
400mm標準。250mmは400mmを現地改造。
400mm STANDARD SUPPLY.
MODIFICATION TO 250mm TO BE MADE LOCALLY.

表1 (Table1)

寸法区分 (mm) DIMENSIONS	公差 (mm) TOLERANCE
L≤50	±1.5
50<L≤100	±2.5
100<L≤500	±3
500<L≤1000	±4

注記
1) 指定外の寸法公差は表1による。
2) 装備位置は船首から1/3(小型船では1/2)程度でキールから1m以内とする。
3) 上下シャフトの長さ(Ls)は、格納タンクの長さ(Lt)に、200mmを加えた値で切断すること。
Ls=Lt+200(mm)
4) 上下装置及び格納タンクの船首方向は左図のごとく。
5) ドーム内部保守点検のため、上下装置上部には図示のスペースを設けるか障害となる天井等に300×300mm程度の角穴をあける。

NOTE
1) TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2) THE HULL UNIT IS GENERALLY PLACED ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF THE SHIP'S LENGTH FROM THE BOW ON THE FORE-AFT LINE AND WITHIN 1000mm FROM KEEL LINE.
3) THE MAIN SHAFT SHOULD BE CUT TO A LENGTH(Ls) GIVEN BY THE FOLLOWING FORMULA.
Ls=Lt+200(mm) Lt:TANK LENGTH
4) BOW MARK SHOWS FORE OR AFT FOR HULL UNIT AND TANK.
5) IF THE OVERHEAD CLEARANCE SHOWN IN THE DRAWING CANNOT BE OBTAINED, MAKE A HOLE OF 300×300mm ON THE OVERHEAD FOR SERVICING.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS
15	上下動制御箱 HULL UNIT CONTROL BOX		1		
14	ギヤカバー GEAR COVER	SUS304	1	06-021-4006	
13	タンクガイド(2) TANK GUIDE(2)	POM	2	06-021-4032	
12	タンクガイド(1) TANK GUIDE(1)	FRP	2	06-021-4031	
11	ジュビリークリップ JUBILEE CLIPS	SUS304	1	1X	
10	送受波器 TRANSDUCER		1		
9	ドーム(2) SOUNDOME		1		
8	ドーム(1) TOP HOUSING	BC2	1	06-021-4201	
7	パイプキャップ PIPE CAP	CR	1	SHN-0011	
6	フランジパッキン GASKET	CR	1	SHJ-0009	
5	スライド金具 SHAFT RETAINER	BC6	1	06-021-4009	
4	上下シャフト MAIN SHAFT	SUS304	1		
3	グリスコットン押え台 GREASE COTTON RETAINER	BC2	1	06-021-4023	
2	架台載台 SHAFT SLEEVE	FC200	1	06-021-4020	
1	格納タンク RETRACTION TANK		1		

DRAWN	Apr. 13, '05 E. MIYOSHI	TITLE	CH-304
CHECKED	TAKAHASHI. T	名称	上下装置(400mmストローク)
APPROVED	Y. Hatai	CH-300	外寸図
SCALE 1/10	MASS 43 ±10% kg MASS W/O TANK/SHAFT/CABLE 質量はタンク、シャフト、ケーブル含まず	NAME	HULL UNIT(400mm TRAVEL)
DWG No.	C1325-G06- A	06-030-400G-0	OUTLINE DRAWING

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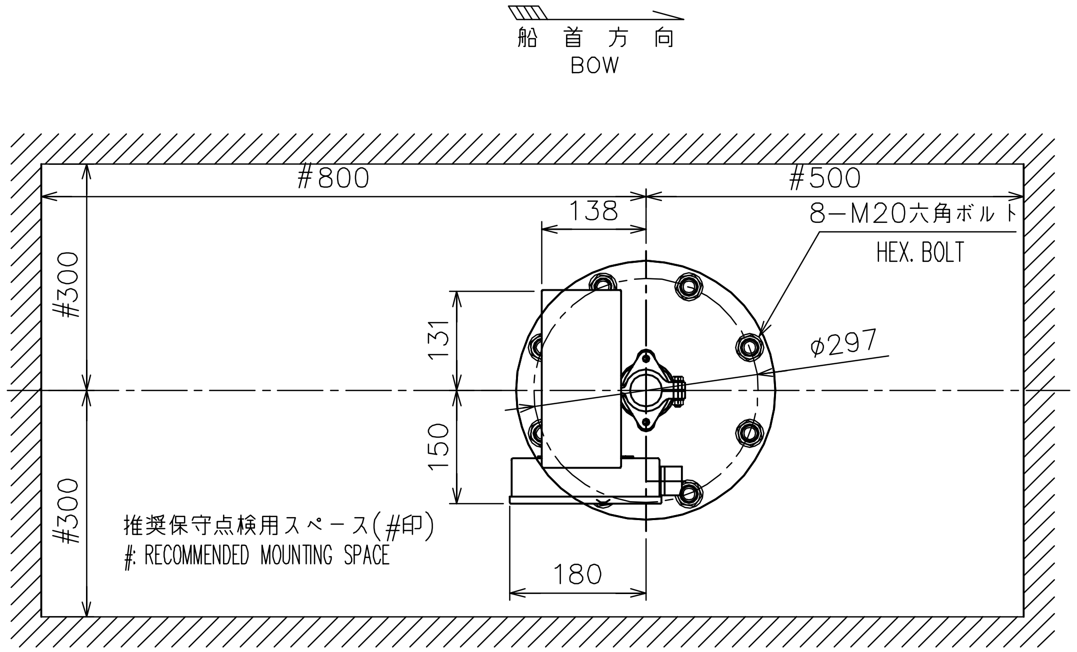
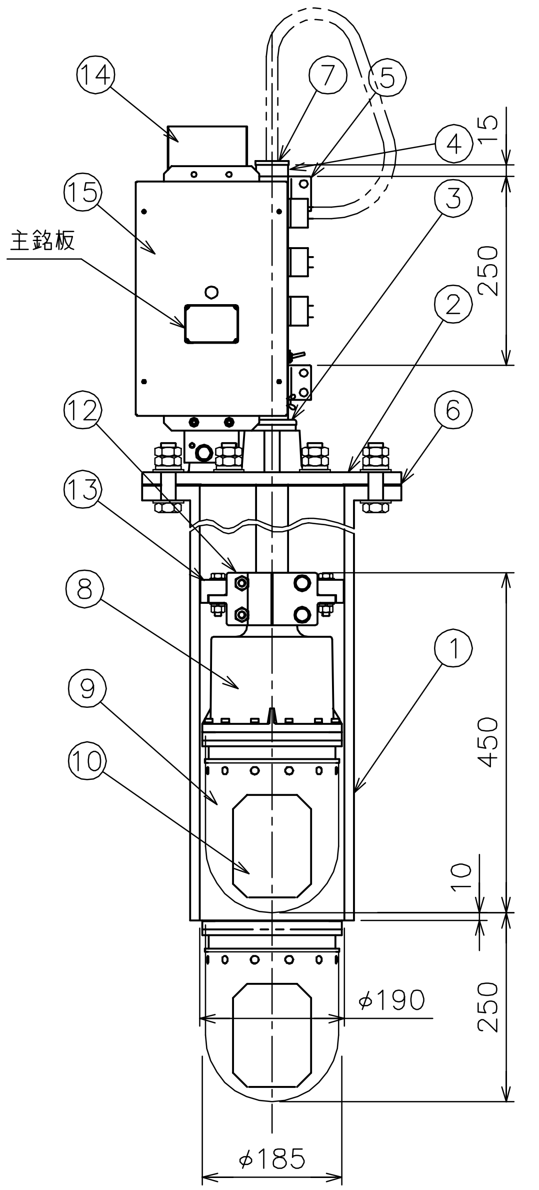


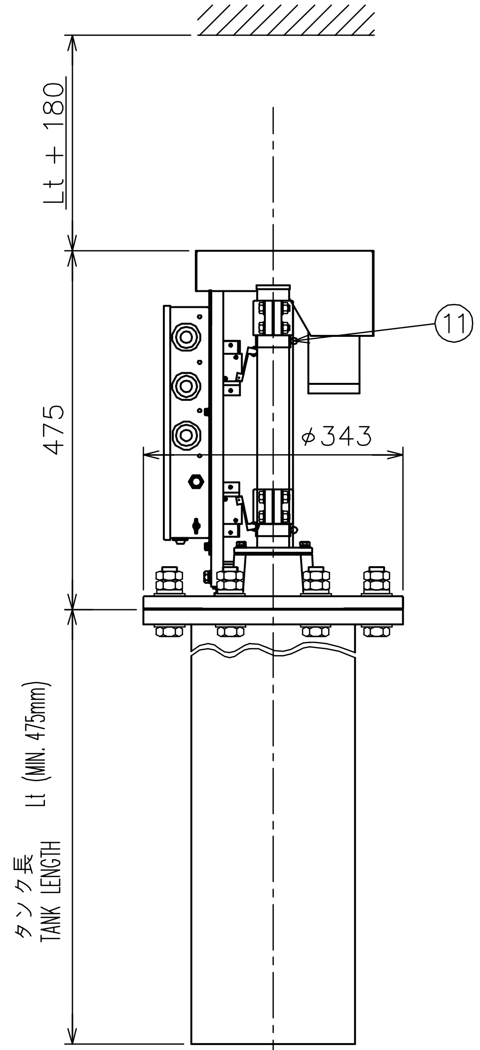
表1 (Table1)

寸法区分 (mm) DIMENSIONS	公差 (mm) TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3
500<L≦1000	±4

注 記
1) 指定外の寸法公差は表1による。
2) 装備位置は船首から1/3 (小型船では1/2) 程度でキールから1m以内とする。
3) 上下シャフトの長さ (Ls)は、格納タンクの長さ (Lt)に、50mmを加えた値で切断すること。
Ls=Lt+50(mm)
4) 上下装置及び格納タンクの船首方向は左図のごとく。
5) ドーム内部保守点検のため、上下装置上部には図示のスペースを設けるか障害となる天井等に300×300mm程度の角穴をあける。

NOTE
1) TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2) THE HULL UNIT IS GENERALLY PLACED ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF THE SHIP'S LENGTH FROM THE BOW ON THE FORE-AFT LINE AND WITHIN 1000mm FROM KEEL LINE.
3) THE MAIN SHAFT SHOULD BE CUT TO A LENGTH(Ls) GIVEN BY THE FOLLOWING FORMULA.
Ls=Lt+50(mm) Lt: TANK LENGTH
4) FORWARD DIRECTION ARROW SHOWS FORE OR AFT FOR HULL UNIT AND TANK.
5) IF THE OVERHEAD CLEARANCE SHOWN IN THE DRAWING CANNOT BE OBTAINED MAKE A HOLE OF 300×300mm ON THE OVERHEAD FOR SERVICING.





品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS
15	上下動制御箱 HULL UNIT CONTROL BOX		1		
14	ギヤカバー GEAR COVER	SUS304	1	06-021-4006	
13	タンクガイド (2) TANK GUIDE(2)	POM	2	06-021-4032	
12	タンクガイド (1) TANK GUIDE(1)	FRP	2	06-021-4031	
11	ジュビリークリップ JUBILEE CLIPS	SUS304	1	1X	
10	送受波器 TRANSDUCER		1		
9	ドーム (2) SOUNDOME		1		
8	ドーム (1) TOP HOUSING	BC2	1	06-021-4201	
7	パイプキャップ PIPE CAP	CR	1	SHN-0011	
6	フランジパッキン GASKET	CR	1	SHJ-0009	
5	スライド金具 SHAFT RETAINER	BC6	1	06-021-4009	
4	上下シャフト MAIN SHAFT	SUS304	1		
3	グリスコットン押え台 GREASE COTTON RETAINER	BC2	1	06-021-4023	
2	架台載台 SHAFT SLEEVE	FC200	1	06-021-4020	
1	格納タンク RETRACTION TANK		1		

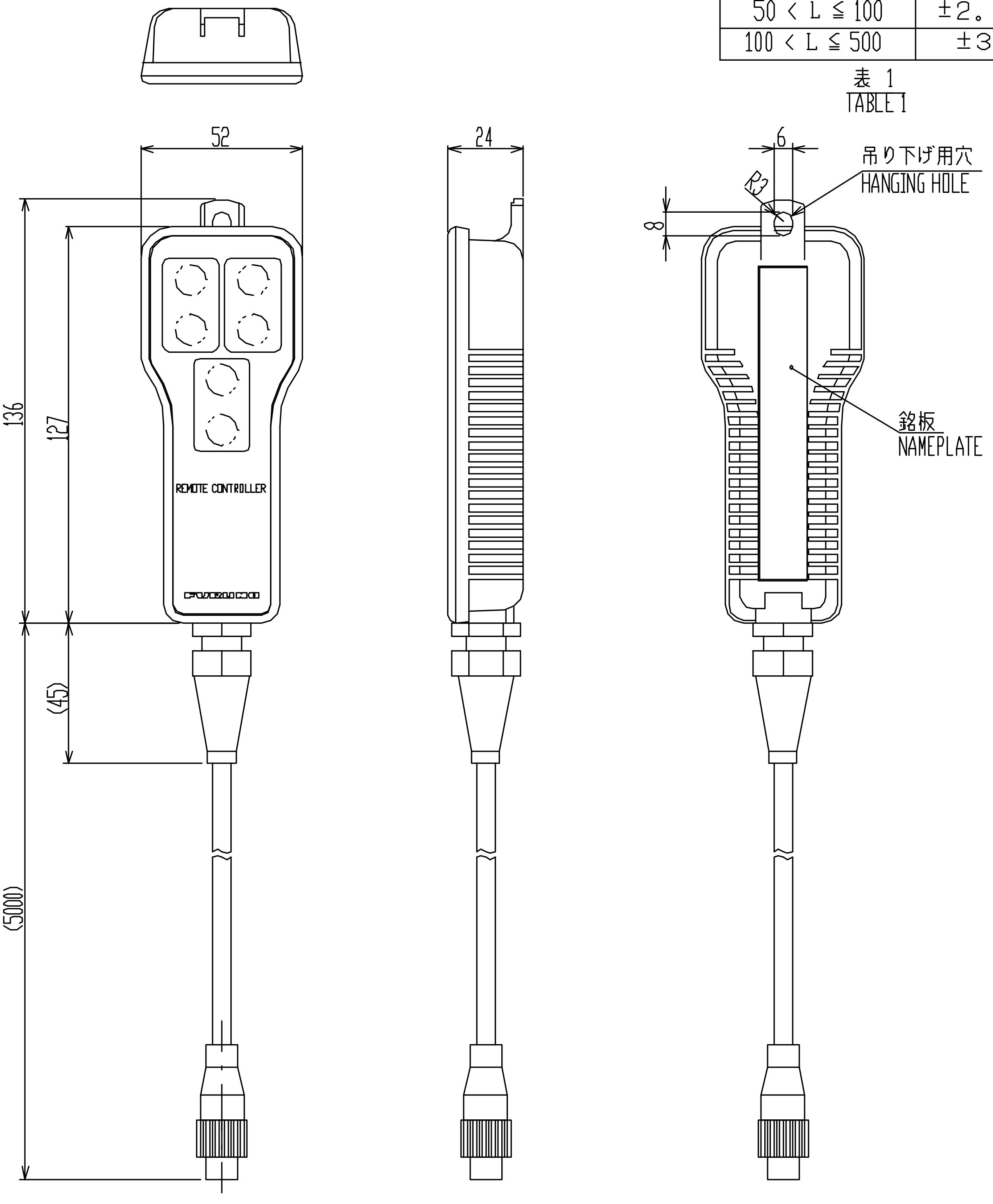
DRAWN	Apr. 13, '05 E. MIYOSHI		TITLE CH-305
CHECKED	TAKAHASHI. T		名称 上下装置(250mmストローク) 外寸図
APPROVED	Y. Hatai	CH-300	
SCALE 1/10	MASS 42±10% kg	MASS W/O TANK/SHAFT/CABLE 質量はタンク、シャフト、ケーブル含まず	NAME HULL UNIT (250mm TRAVEL) OUTLINE DRAWING
DWG No.	C1325-G07- A	06-030-410G-0	

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図 番

寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
0 < L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3

表 1
TABLE 1



注記　1）指定なき寸法公差は表1による。
NOTE　1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN June 1, 2003 H. MAKI		TITLE CH-256
CHECKED Takahashi T.		名称 リモートコントローラ
APPROVED Takahashi T.	CH-250/CH-270	外寸図
SCALE 1/2 MASS 0.3 ±10% kg	質量はケーブル重さを含む MASS W/ CABLE	NAME REMOTE CONTROLLER
DWG.No. C1316-G06- D	06-021-6000-G2	OUTLINE DRAWING

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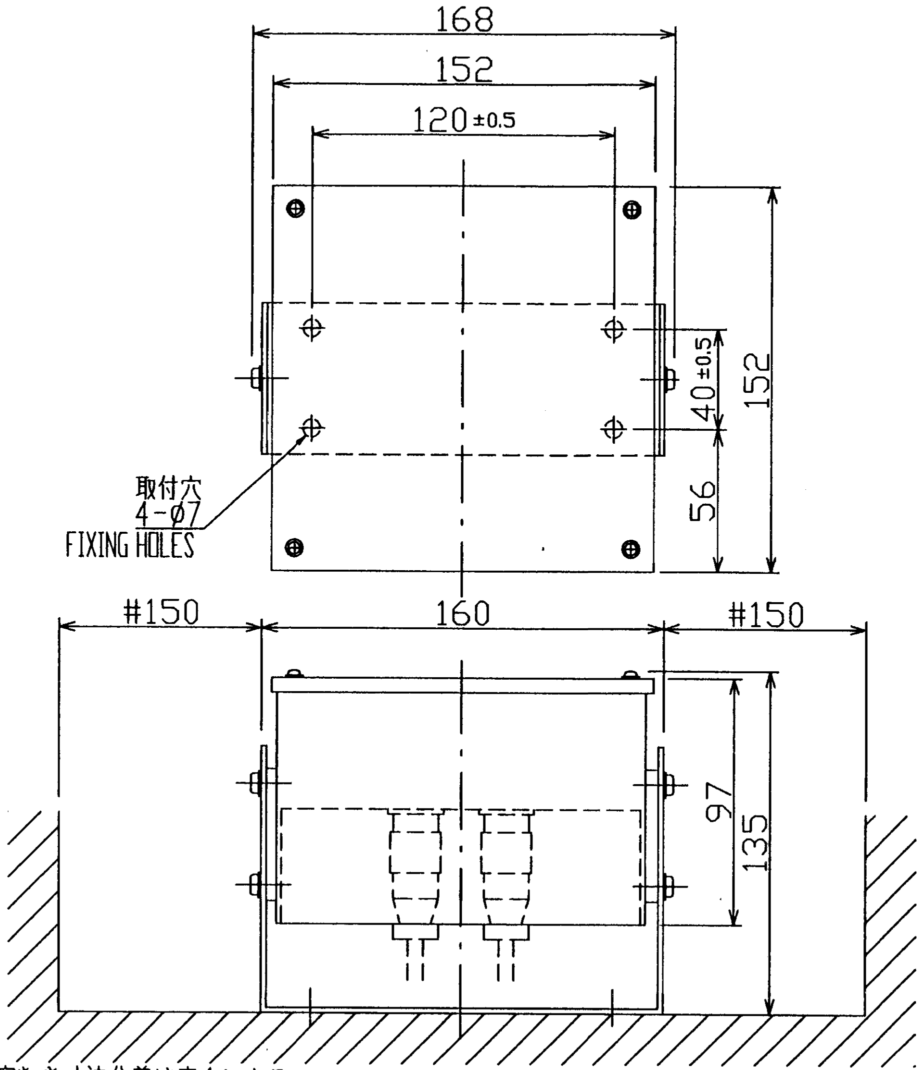
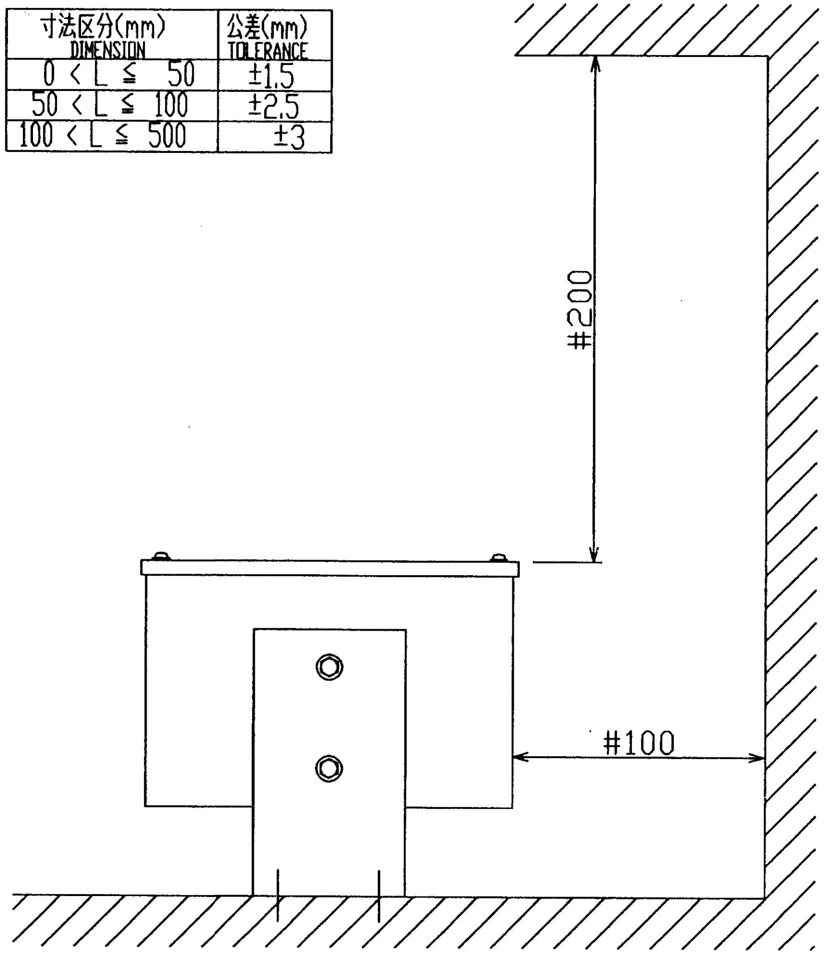


表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3

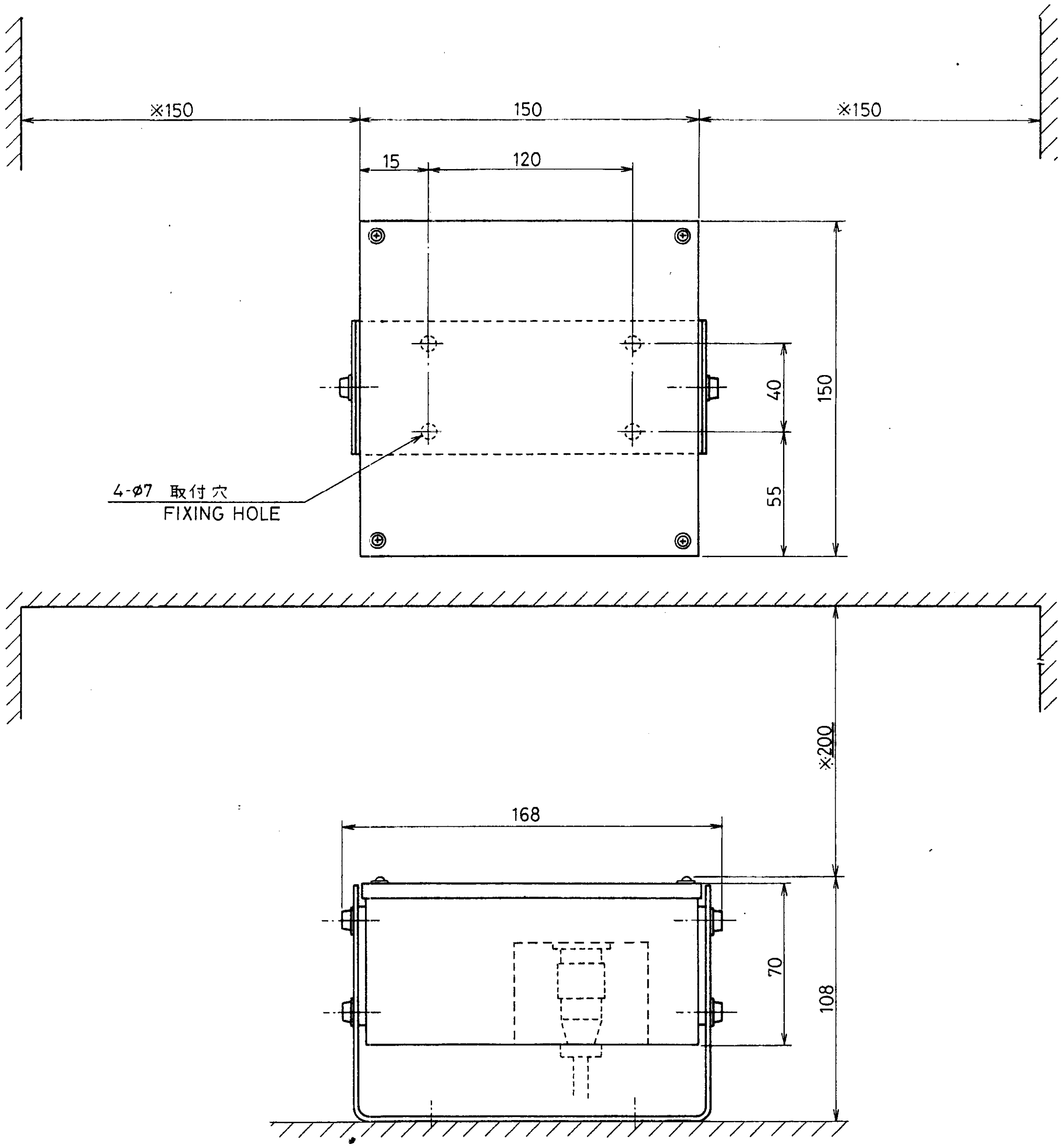


注記
1）指定なき寸法公差は表1による。
2）#：推奨する最小サービス空間寸法。
3）船首マーク(FORE)を船首方向に向けて、
きょう体を水平に取り付けること。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.
3. ORIENT THE 'FORE' MARK ON THE UNIT TOWORD SHIP'S BOW AND MOUNT THE UNIT LEVEL IN PARALLEL WITH SURFACE.

DRAWN Nov. 6 '01 T.YAMASAKI	TITLE	MS-100
CHECKED Nov.6 '01 Y.Kimura	名称	動揺検出器
APPROVED Nov.6 '01 Y.Kimura		外寸図
SCALE 1/3 MASS 1.1 kg ±10%	NAME	MOTION SENSOR
DWG.No. C1278-G01- B		OUTLINE DRAWING

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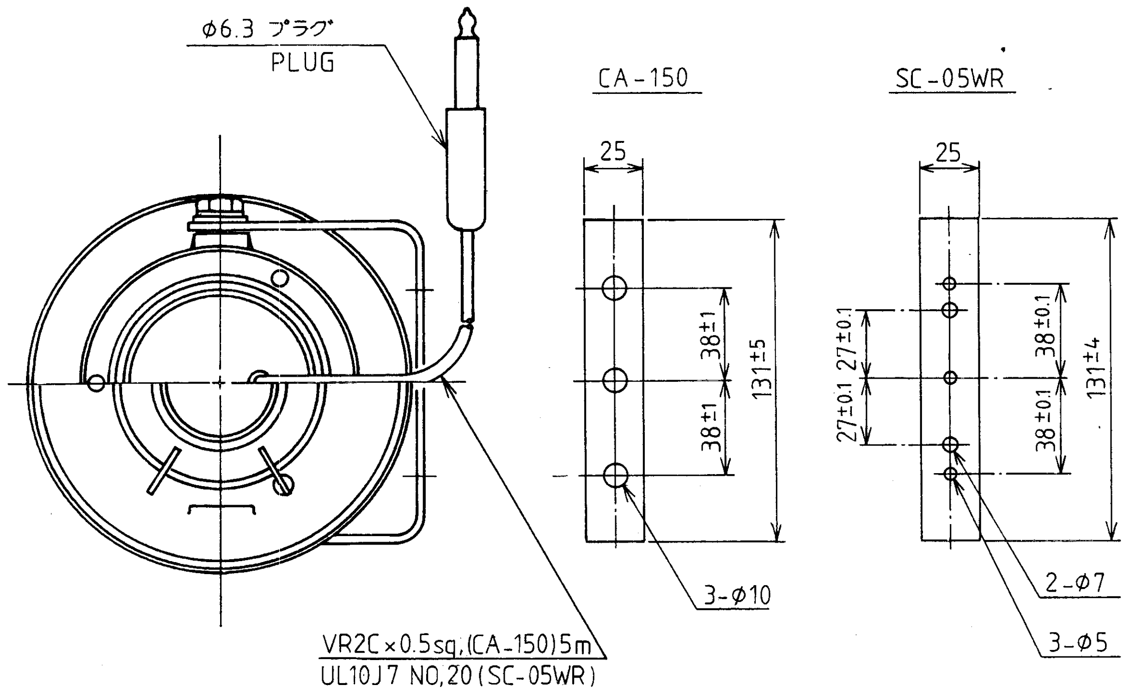


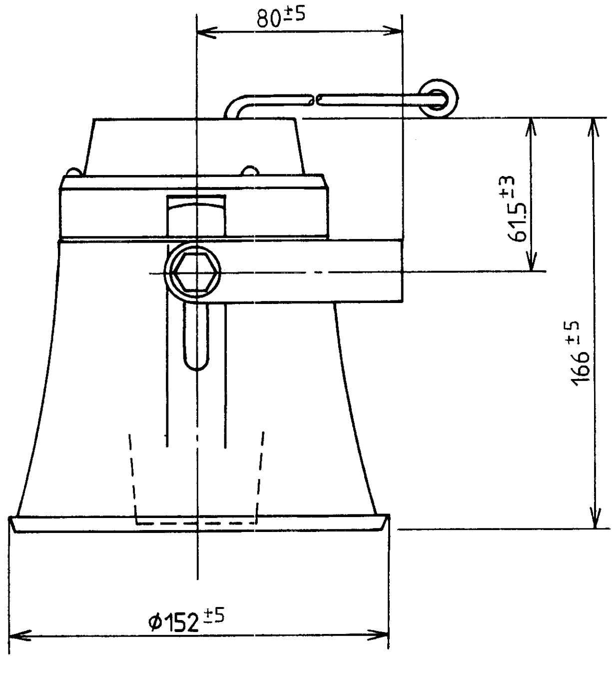
NOTE 1. 保守点検及び放熱用として ※印のスペースをとる事。
DIMENSIONS MARKED "※" SHOW RECOMMENDED MAINTENANCE AND VENTILATION SPACE.
2. 船体の回転の中心に水平に取り付ける事。
INSTALL THE UNIT HORIZONTALLY ON THE ROTATION AXES OF SHIP'S ROLLING AND PITCHING.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

承認 APPROVED	JAN. 8 '86	三角法 THIRD ANGLE PROJECTION		名称 TITLE	傾斜角検出器
検図 CHECKED	Jan. 8. 86	尺度 SCALE	1/3	BS-704	CLINOMETER
製図 DRAWN	Oct. 29. 85	重量 WEIGHT	2 kg	図番 DWG. NO.	C1259-009-C

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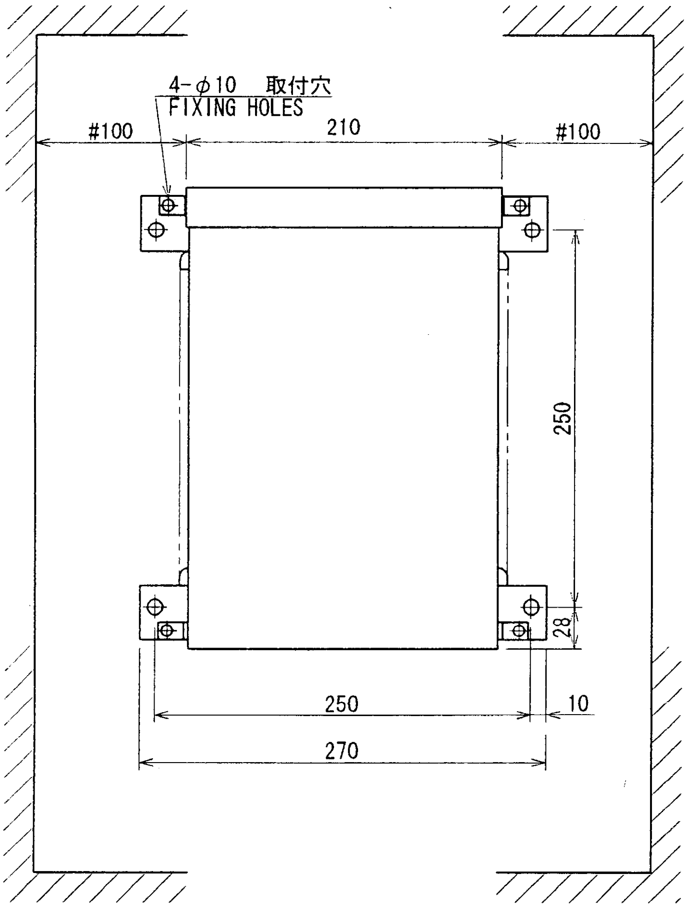
RATING

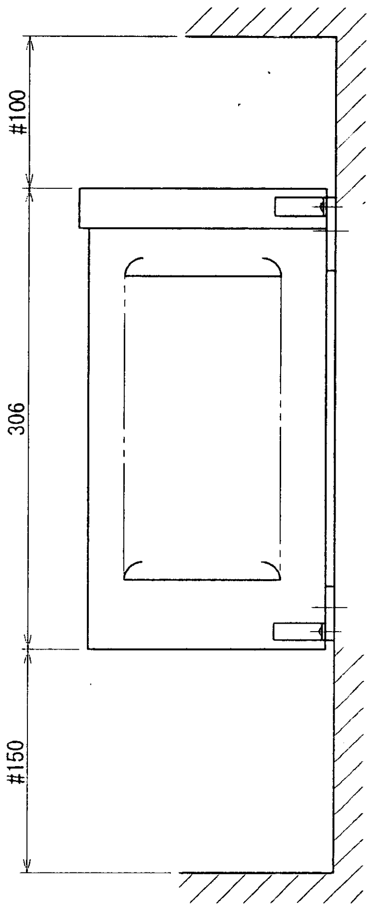
MAX. INPUT	5W
IMPEDANCE	4Ω
SOUND PRESSURE	104dB
FREQ. RESPONSE	400Hz~5kHz

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

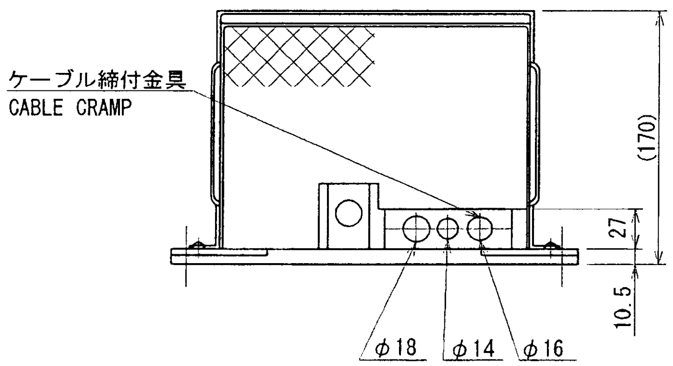
承認 APPROVED	SEP. 20. '88 T. NAKANO	三角法 THIRD ANGLE PROJECTION	名称 TITLE	5W トランペット スピーカ
検図 CHECKED	Sept. 20. 88 M. IKEDA	尺度 SCALE: 1/3	CA-150 SC-05WR	TRUMPET SPEAKER
製図 DRAWN	Aug. 30. '88 K. Kusunoki	質量 MASS: 1.2 kg	図番 DWG. NO.	C5016-101-D

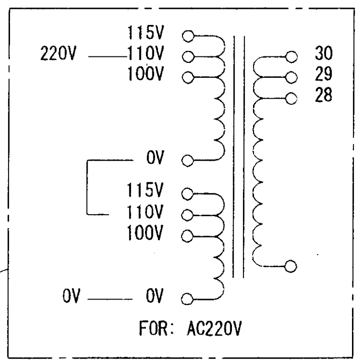
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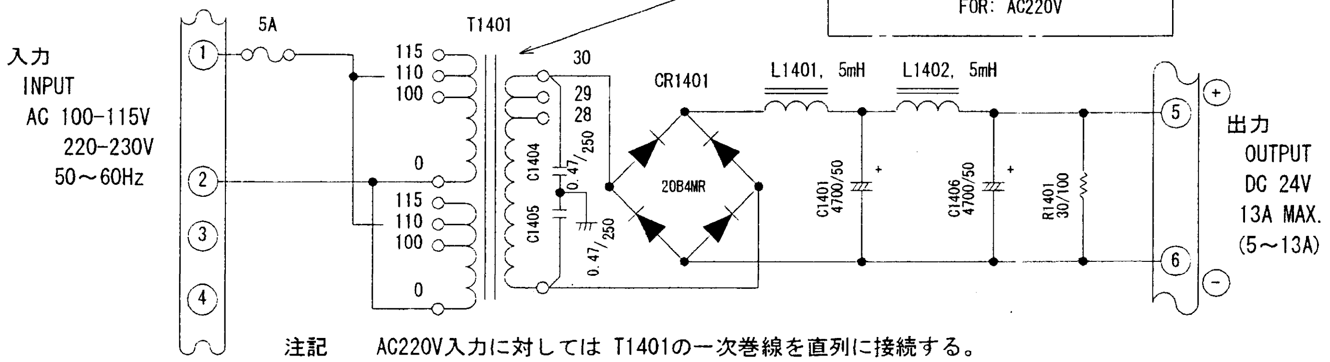




NOTE 1. # : 推奨サービス空間
RECOMMENDED SERVICE CLEARANCE.







注記 AC220V入力に対しては T1401の一次巻線を直列に接続する。
NOTE FOR 220V AC INPUT, CONNECT T1401 PRIMARY WINDINGS IN SERIES.

DRAWN Aug 16 '00 T.YAMASAKI	TITLE	RU-1746B-2
CHECKED Aug 17 '00 Y.K.	名称	整流器
APPROVED Aug 17 '00 Y.K.		外寸図
SCALE 1/5 MASS 17 kg ±10%	NAME	RECTIFIER UNIT
DWG. No. C3002-002- N		OUTLINE DRAWING

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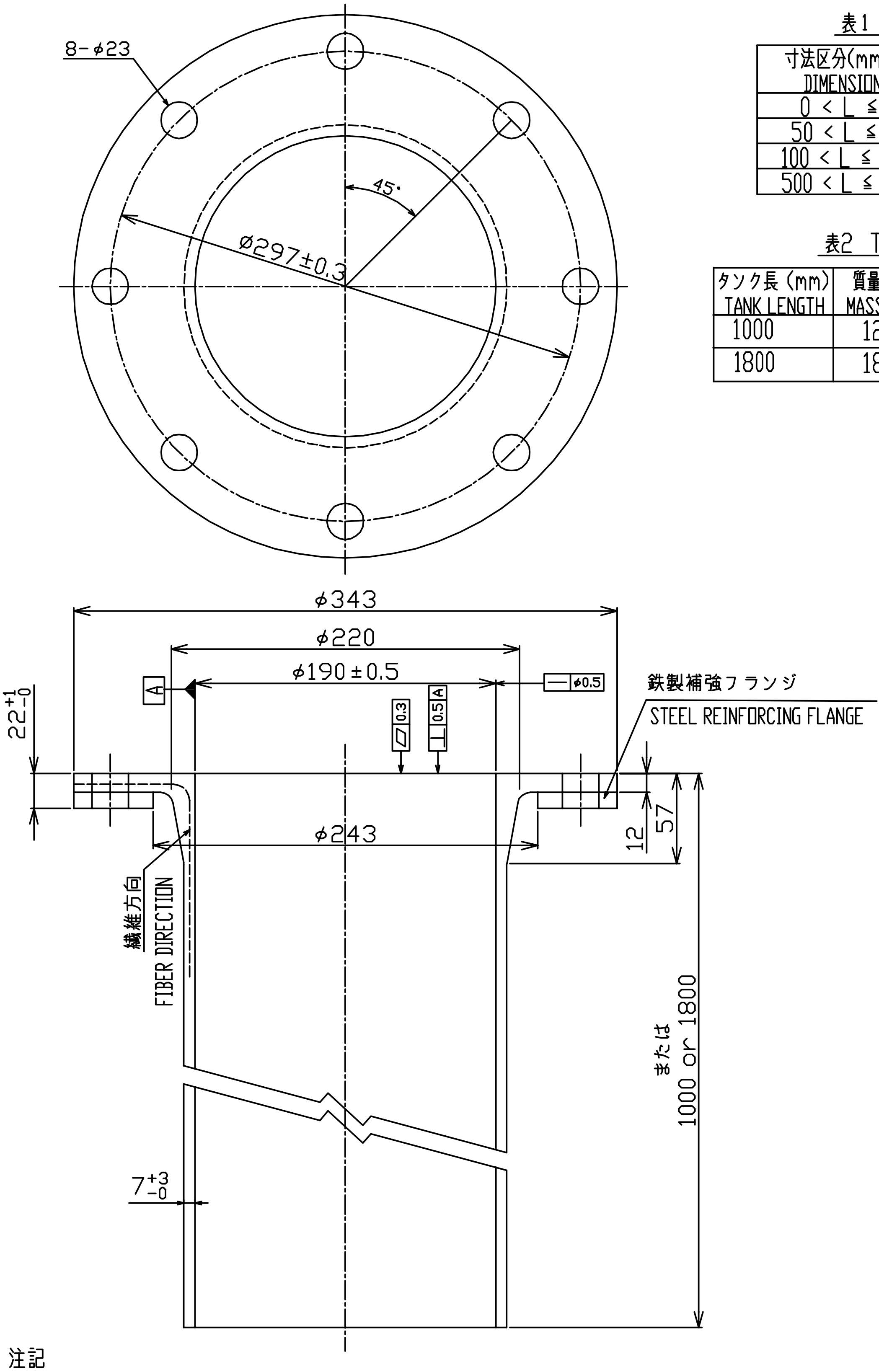


表1 TABLE 1

寸法区分(mm) DIMENSIONS	公差(mm) TOLERANCE
0 < L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3
500 < L ≦ 1000	±4

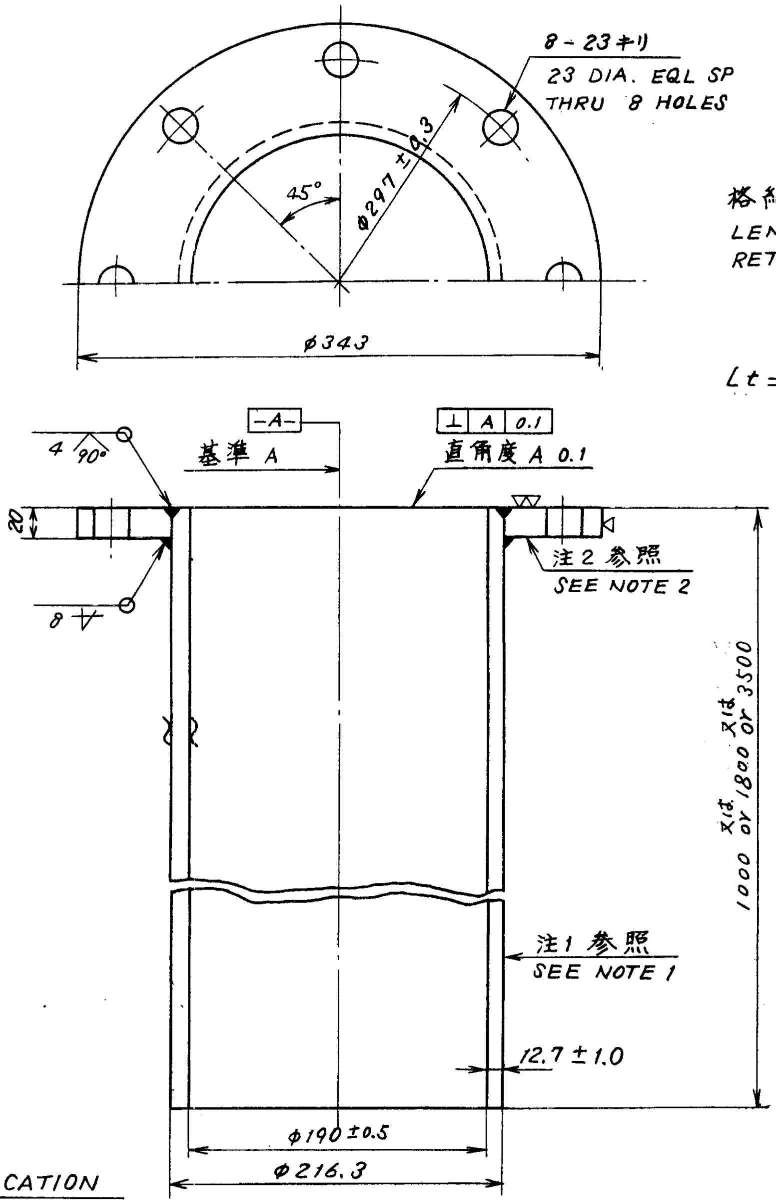
表2 TABLE 2

タンク長 (mm) TANK LENGTH	質量 (kg) MASS(±10%)	タンク型式 TANK TYPE
1000	12	06-021-4024
1800	18	06-007-1573

注記
1）指定外の寸法公差は表1による。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Nov. 04 '05 E. MIYOSHI		TITLE	06-021-4024/06-007-1573
CHECKED TAKAHASHI.T		名称	FRP格納タンク
APPROVED Y. Hatai	CH-250		外寸図
SCALE 1/4 MASS 表2参照 SEE TABLE 2	質量は鉄製補強フランジを含む MASS W/ STEEL REINFORCING FLANGE	NAME	RETRUCTION TANK (FOR FRP HULL)
DWG.No. C1315-G14- C	06-021-4024-0/06-07-1573-0		OUTLINE DRAWING



格納タンクの長さ;
LENGTH OF RETRACTION TANK;

Lt = [ ] mm

製作時の注意
NOTE FOR FABRICATION

1. 材料はSTPG38-E-C(圧力配管用炭素鋼鋼管 冷間仕上電気抵抗溶接鋼管 呼び径 200A スケジュール 80)を使用のこと。
2. 材料は SS41P を使用のこと。
3. タンク側面は大日本ペイント速乾鉛丹ペイントを2回塗布のこと。
4. タンク内面はビニールAF (中国塗料)を2回塗布のこと。
5. タンク上面は塗装しないこと。

1. USE STPG-38-E-C (8"SCHEDULE 80, JIS G3454, CARBON STEEL PIPE FOR PRESSURE SERVICE).
2. USE SS41P (JIS G3101, ROLLED STEEL FOR GENERAL STRUCTURE).
3. GIVE TWO COATS OF FAST-DRYING RED LEAD PAINT ON OUTSIDE OF TANK.
4. GIVE TWO COATS OF VINYL PAINT AF OR ANTI-FOULING PAINT ON INSIDE OF TANK.
5. DO NOT PAINT ON SURFACE OF FLANGE.

単位 UNIT: mm

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

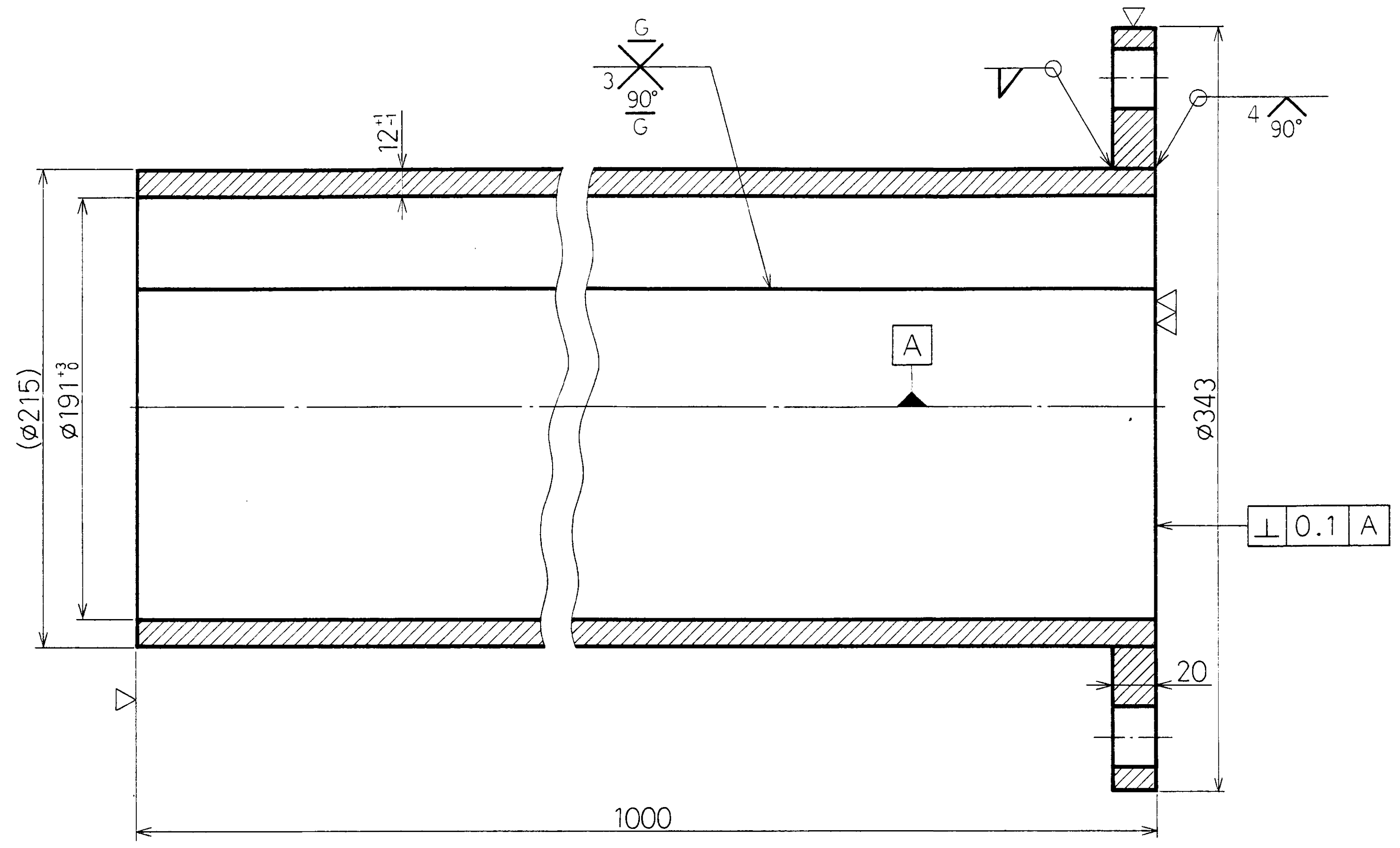
承認 APPROVED	NOV. 9 .'77	三角法 THIRD ANGLE PROJECTION	名称 TITLE: 鉄製格納タンク外観図 STEEL RETRACTION TANK OUTLINE DRAWING
検図 CHECKED	NOV. 8 .'77	尺度 SCALE: 1/5	
製図 DRAWN	'77 · 6 · 28	重量 WEIGHT: 1000mm : 73 / 1800mm : 123 kg / 3500mm : 231	図番 DWG. NO. C1229-006-G

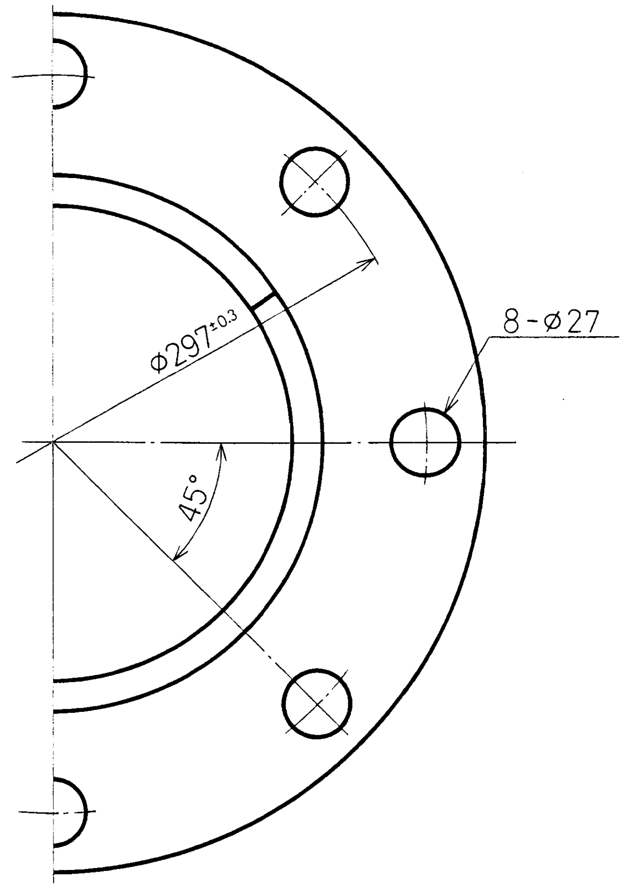
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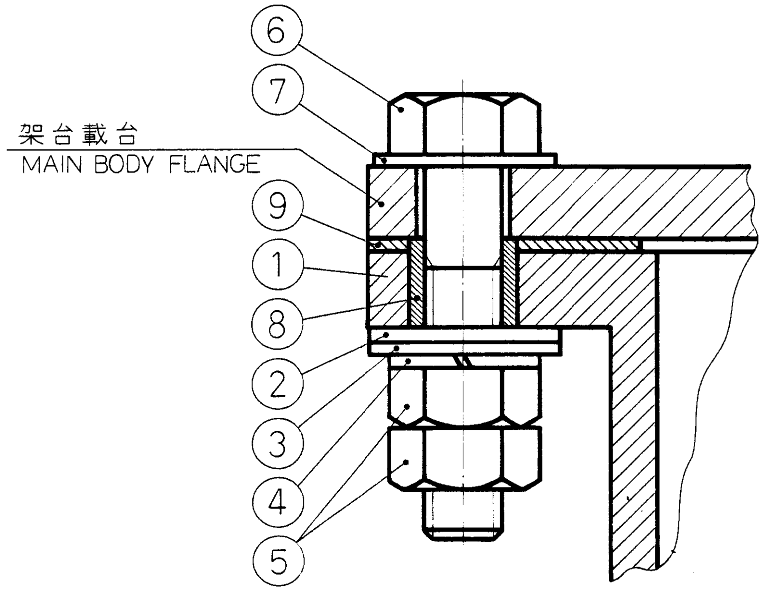
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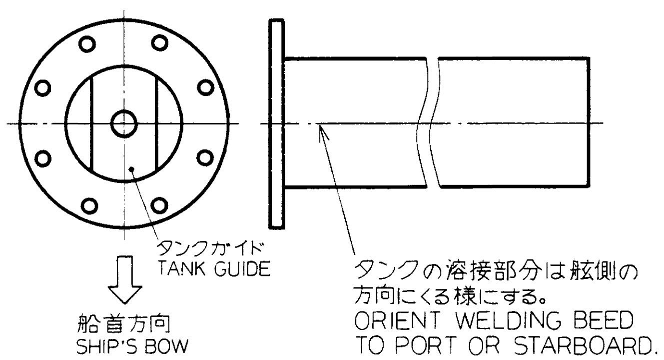
D-18







a) 格納タンク装備要領
ORIENTATION OF TANK



注）架台, 格納タンクに他の電気機器のアースを取らないこと。

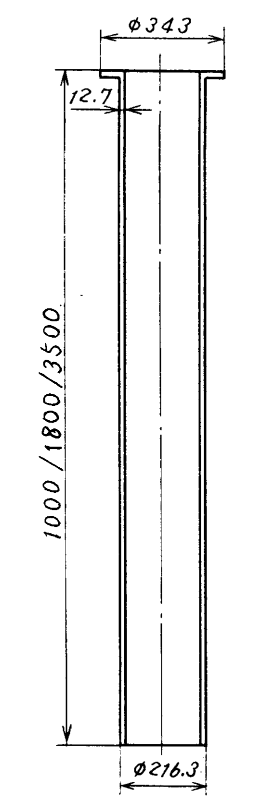
NOTE. DO NOT CONNECT GROUNDING WIRE OF OTHER EQUIPMENT TO RETRACTION TANK.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS
9	フランジパッキン GASKET	CR	1	SHJ-0009-1	
8	絶縁パッキン (2) INSULATION PACKING (2)	CR	8	MS-1000-68	
7	平座金 FLAT WASHER	SUS304	8	M20用	
6	六角ボルト HEX. BOLT	SUS304	8	M20 × 100	
5	六角ナット HEX. NUT	SUS304	8	M20	
4	スプリングワッシャ SPRING WASHER		8		
3	ワッシャ WASHER	SUS304	8	SHG-0002	
2	絶縁板 (2) INSULATION WASHER (2)	CR	8	SHG-0004	
1	格納タンク (アルミ) RETRACTION TANK	A5083	1	10-044-2601	

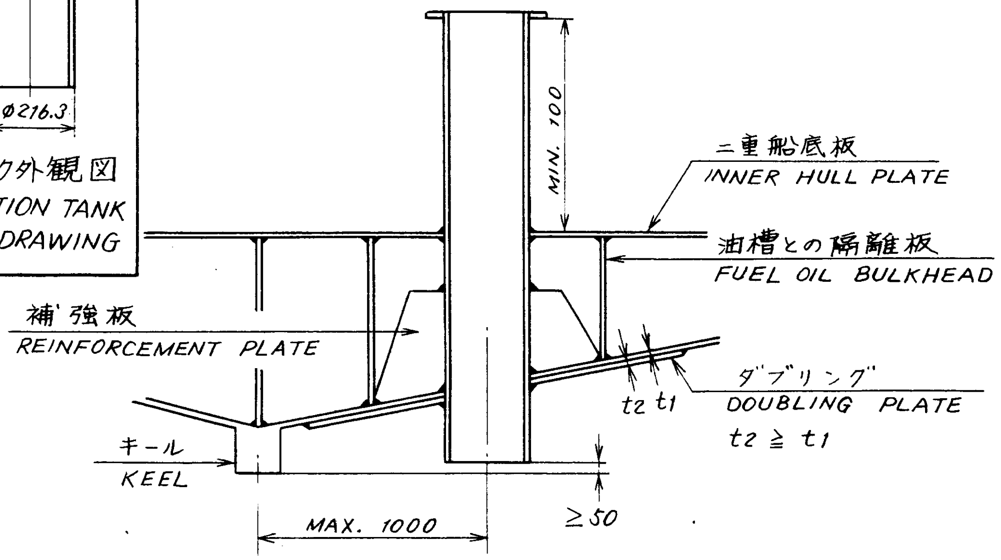
承認 APPROVED	DEC. 27. '90 T. NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンク(アルミ)外寸図 RETRACTION TANK (ALUMINUM)
検図 CHECKED	DEC. 27. '90 T. MIYOSHI	尺度 SCALE	1/3		
製図 DRAWN	DEC. 27. '90 M. USUDA	重量 WEIGHT	35 kg	図番 DWG. NO.	C1273-G09-A

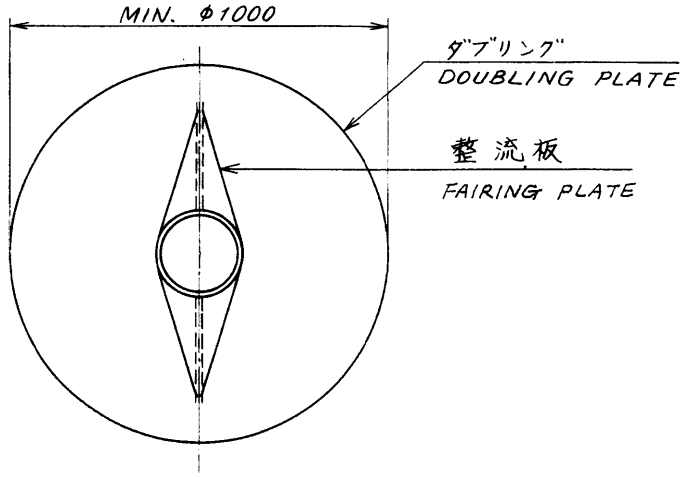
CSH-5

FURUNO ELECTRIC CO., LTD.



格納タンク外観図
RETRACTION TANK OUTLINE DRAWING





1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) フランジのボルト締めのためフランジ下面と障害物（二重船底等）との間に100mm以上のスペースがあること。
   4) タンクの先端はキールの先端より50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの周辺の船底板に径1000程度のダブリングを施すこと。
3. 格納タンクの突出部分に網除けを兼ねた整流板を設けること。
4. 必要に応じて格納タンク周辺に油槽との隔離板をめぐらせること。
   またタンク周囲.3.4ヶ所で船底板に向けて補強板を溶接すること。

注：強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し.
取付位置.方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW ON FORE-AFT LINE.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. DOUBLING PLATE OF ABOUT 1000 mm IN DIA. SHOULD BE INSTALLED BY THE SHIPYARD.
3. FAIRING PLATE (NET PROTECTOR) SHOULD BE INSTALLED AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM BY THE SHIPYARD.
4. IF REQUIRED, FUEL OIL BULKHEAD AND REINFORCEMENT PLATE SHOULD BE INSTALLED BY THE SHIPYARD.

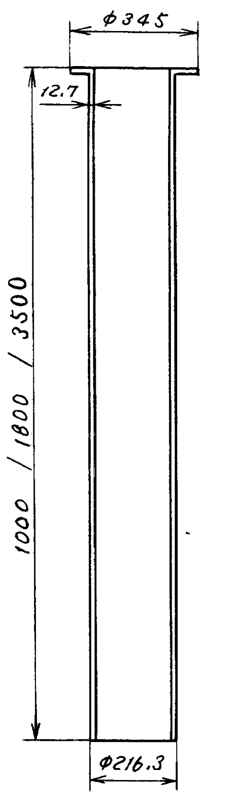
CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

単位 UNIT: mm

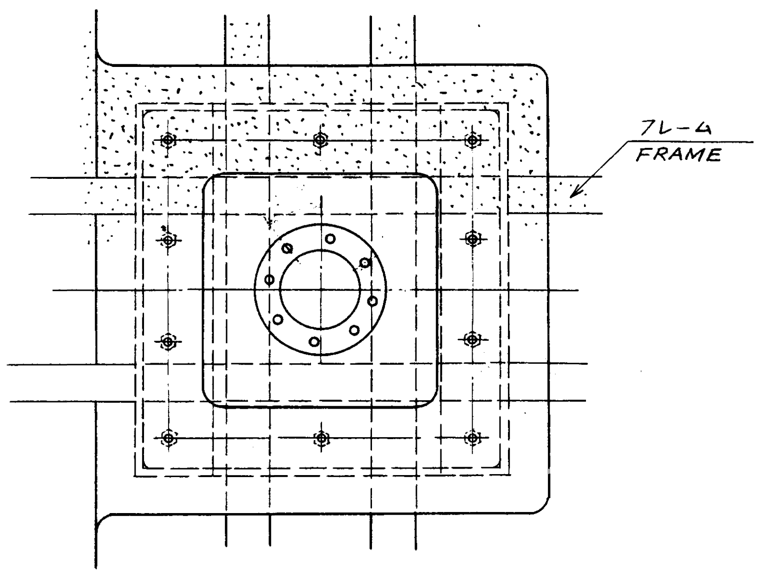
CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

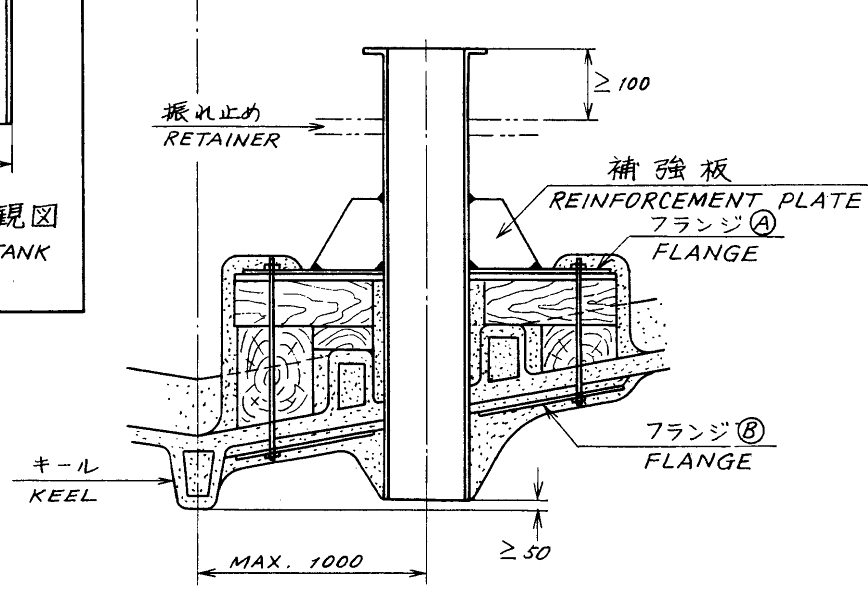
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

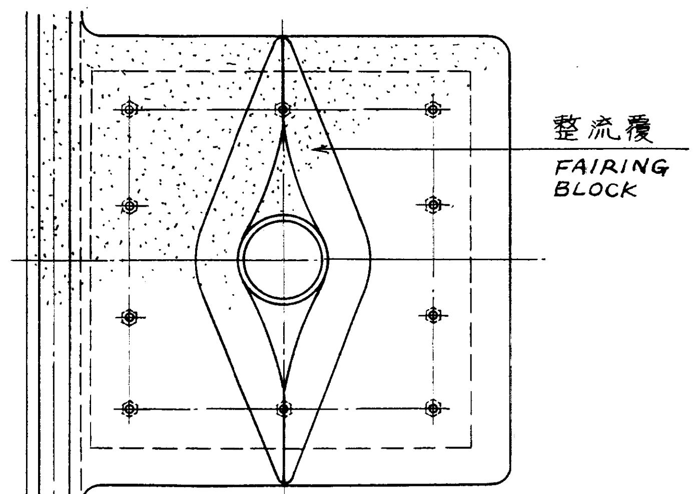
承認 APPROVED	NOV. 9 '77	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンク船底装備図(鋼船) RETRACTION TANK INSTALLATION ON STEEL HULL
検図 CHECKED	NOV. 8 '77	尺度 SCALE	1/20		
製図 DRAWN	1977.11.7	重量 WEIGHT	kg	図番 DWG. NO.	C1243-017-F



鉄製格納タンク外観図
STEEL RETRACTION TANK
OUTLINE DRAWING







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) フランジのボルト締めのため フランジ下面と障害物（二重船底等）との間に100mm以上のスペースがあること。
   4) タンクの先端はキールの先端より50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの装備は、次の要領を参考にして行うこと。
   1) フレーム間の船底にタンクが通る穴をあける。
   2) タンクあるいはタンクと同径の中子を貫通させ、その回りにフランジⒶの乗せられる取付台を作りFRPでフレーム、船底間に固定する。
   3) フランジⒶの取付穴に合わせて取付台にボルトを立てておく。必要があればフランジⒷを作りボルトを船底から貫通させる。
   4) FRP硬化後タンクあるいは中子を抜き取る。
   5) フランジⒶをタンクに溶接する。
   6) フランジⒶ下面及びタンク外周にFRP－鉄接着剤を塗布した後タンクを取りつける。
   7) 浸水を防ぐため充分にFRPで必要個所を塗り固める。特にタンク回りは流線型に成型し水による抵抗及び気泡発生を最少限におさえる様努めること。
   8) 必要に応じてタンクのフランジ面下部100mmの位置より隔壁等に向けて振れ止めを設けること。またフランジⒶ溶接時、タンクの周囲3,4ヶ所でフランジⒶに向けて補強板を溶接する。

注： 強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. INSTALL THE RETRACTION TANK REFERRING TO THE PROCEDURE BELOW.
   1) CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL PLATE.
   2) PASS THE TANK OR A CORE HAVING THE SAME DIAMETER AS THE TANK THRU THE HULL PLATE. MAKE A MOUNTING BED WITH WOODEN BLOCK AND FRP AROUND THE TANK OR THE CORE. THIS BED IS USED TO MOUNT THE FLANGE Ⓐ.
   3) WHEN FABRICATING THE MOUNTING BED, STAND THE BOLTS ON THE BED FOR FIXING THE FLANGE Ⓐ. IF NECESSARY, MAKE THE FLANGE Ⓑ TO ENSURE FIXING OF THE FLANGE Ⓐ.
   4) AFTER FRP IS STIFFENED, DRAW OUT THE TANK OR THE CORE FROM THE MOUNTING BED.
   5) WELD THE FLANGE Ⓐ TO THE TANK.
   6) APPLY A STEEL-FRP ADHESIVE TO THE TANK AND THE FLANGE Ⓐ, AND INSTALL THE TANK WITH FLANGE Ⓐ IN PLACE. SETTLE THE FLANGE Ⓐ WITH BOLTS AND NUTS.
   7) APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION
   8) IF REQUIRED, INSTALL A REINFORCEMENT PLATE WHEN THE FLANGE Ⓐ IS WELDED TO THE TANK. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

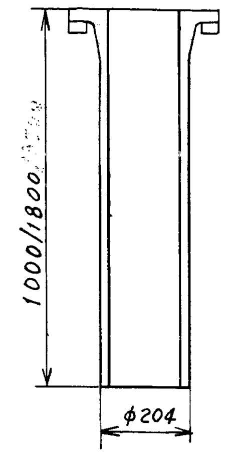
CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

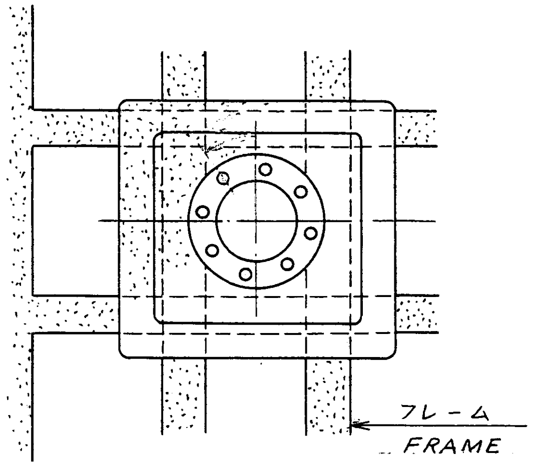
承認 APPROVED	NOV. 9. '77	三角法 THIRD ANGLE PROJECTION		名称 TITLE	鉄製格納タンク船底装備図（FRP船） STEEL RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	NOV. 8. '77	尺度 SCALE	1/20		
製図 DRAWN	1977. 11. 7	重量 WEIGHT	kg	図番 DWG. NO.	C1243-019-F

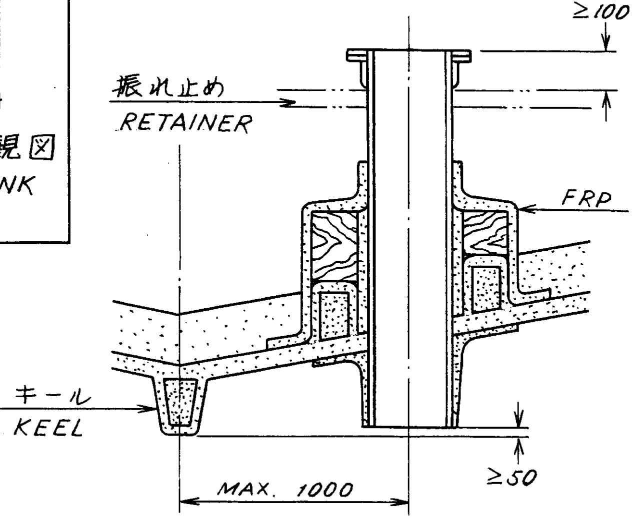
CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

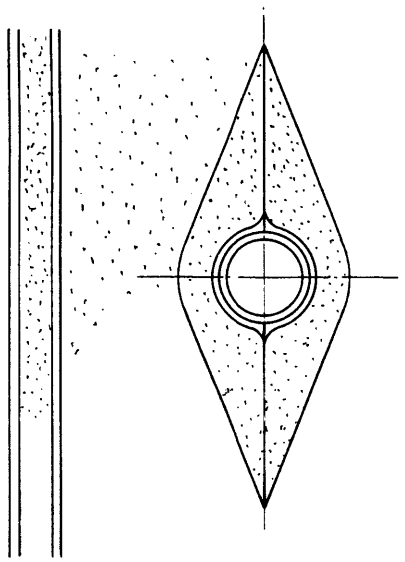
単位 UNIT: mm



FRP製格納タンク外観図
FRP RETRACTION TANK
OUTLINE DRAWING







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) フランジのボルト締めのためフランジ下面と障害物（二重船底等）との間に100mm以上のスペースがあること。
   4) タンクの先端はキールの先端より50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 浸水を防ぐため充分にFRPで必要個所を塗り固める。特にタンク回りは流線型に成型し水による抵抗及び気泡発生を最少限におさえる様努めること。
3. 必要に応じてタンクのフランジ面下部 100mmの位置より隔壁等に向けて振れ止めを設けること。

注： 強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION.
3. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

承認 APPROVED		三角法 THIRD ANGLE PROJECTION	名称 TITLE FRP製格納タンク船底装備図(FRP船) FRP RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	May. 14. 1978	尺度 SCALE 1/20	
製図 DRAWN	July. 18. 1978	重量 WEIGHT kg	図番 DWG. NO. C1220-038-F

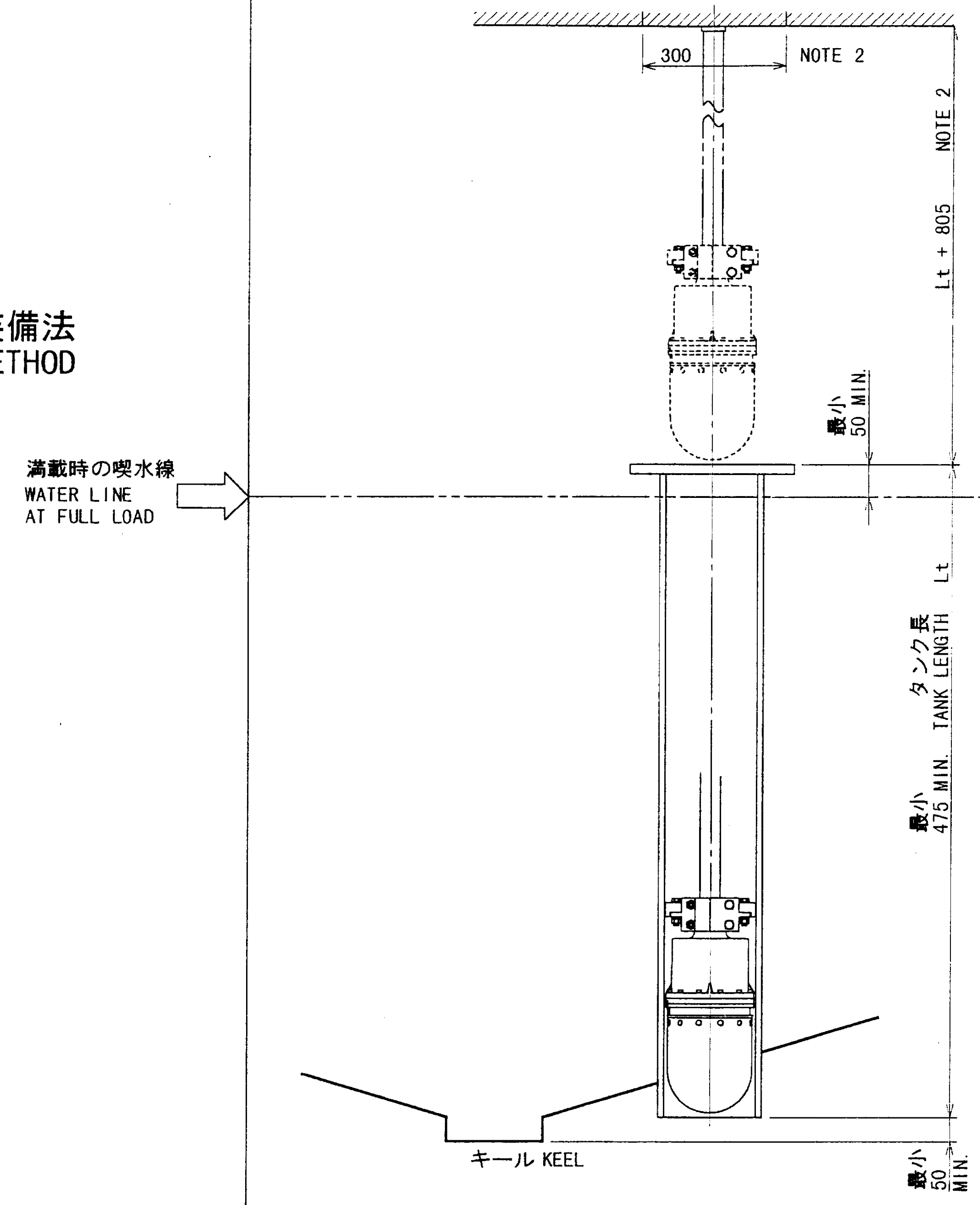
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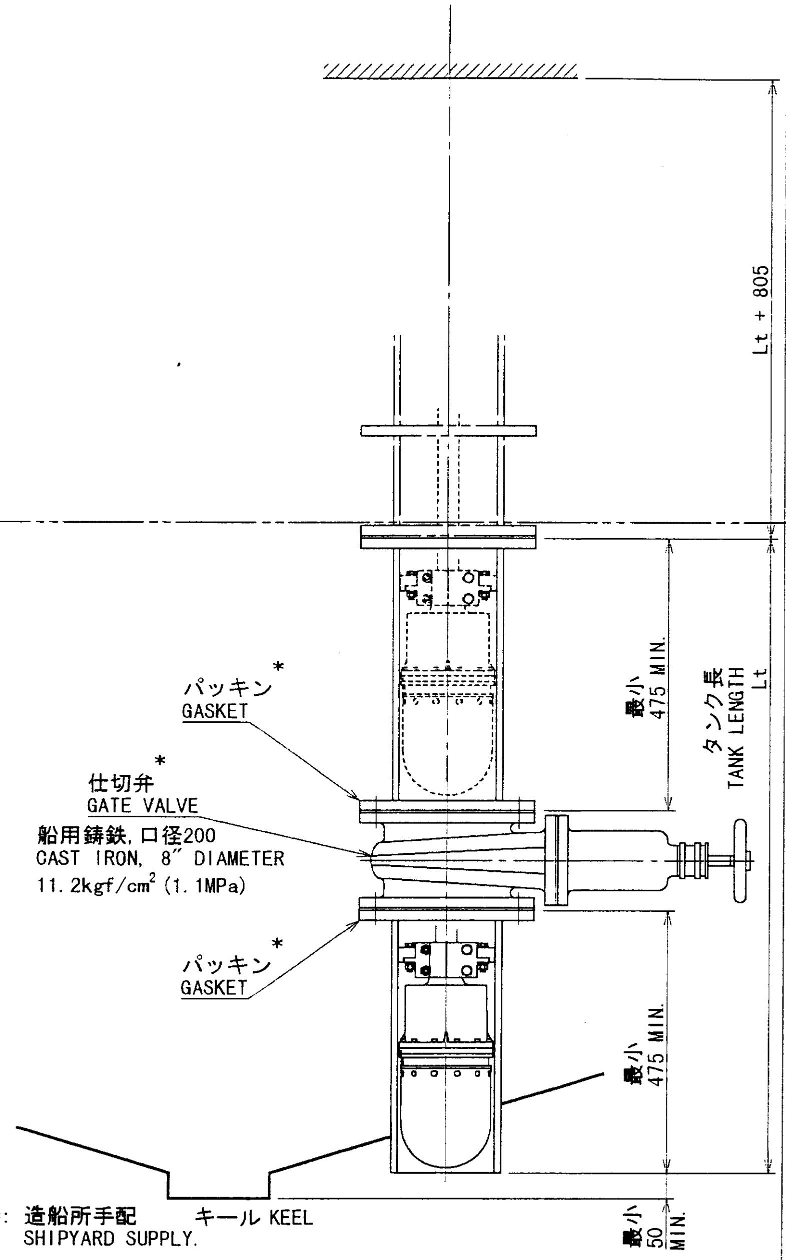
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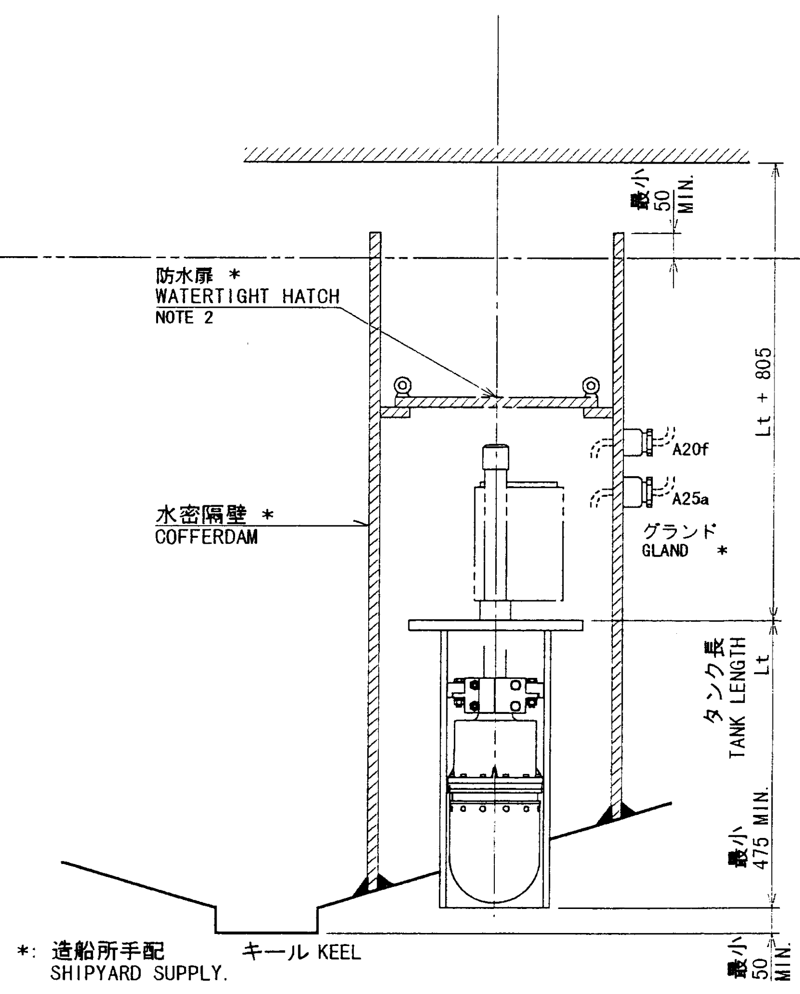
D-22

	A	B	C
条　件 CONDITION	タンク長を満載時の喫水線の上まで取れる場合。 WHEN THE LONGER TANK IS USED SO THAT ITS FLANGE POSITIONS ABOVE WATER LINE.	1. オフシーズンに上下装置を取りはずしておく場合。 WHEN THE LONGER TANK IS USED SO THAT ITS FLANGE POSITIONS ABOVE WATER LINE. 2. タンク長を喫水線の上まで取れない場合。 WHEN THE LONGER TANK IS USED DUE TO LIMITED CLEARANCE.	タンク長を喫水線まで取れない場合で、仕切弁を使用しないとき。 WHEN THE LONGER TANK OR A GATE VALVE CANNOT BE USED.

装備法
METHOD







注　記
NOTE

A

1. この装備法を標準として推奨する。
   THIS METHOD IS RECOMMENDED AS STANDARD INSTALLATION.
2. 上下装置の上部に十分なサービス空間が取れない場合は、天井に"300×300"の穴をあけておくこと。
   WHEN OVERHEAD CLEARANCE IS NOT ALLOWED, MAKE A HOLE OF 300x300 mm ON CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.

B

1. 上記の(1)の目的でこの装備法を行う場合には左図(A)と同様に喫水線の上までタンク長を取る方が望ましい。
   THE TANK FLANGE POSITION IS DESIRED TO BE ABOVE WATER LINE, AS LIKE THE INSTALLATION METHODE 'A'.

C

1. 水密隔壁は、船級協会規則を参照し、造船所で製作してください。その際、サービス空間も考慮してください。
   FABRICATE THE COFFERDAM BY SHIPYARD IN ACCORDANCE WITH CONCERNED REGULATIONS. ALSO ALLOW ENOUGH SERVICE CLEARANCE.
2. 水密隔壁の上限を喫水線の上までとれない場合にも、上下装置取り外しのための防水扉を設けること。
   PROVIDE A WATERTIGHT HATCH FOR FUTURE MAINTENANCE IF A COFFERDAM IS NOT HIGH ABOVE WATER LEVEL.

注　記

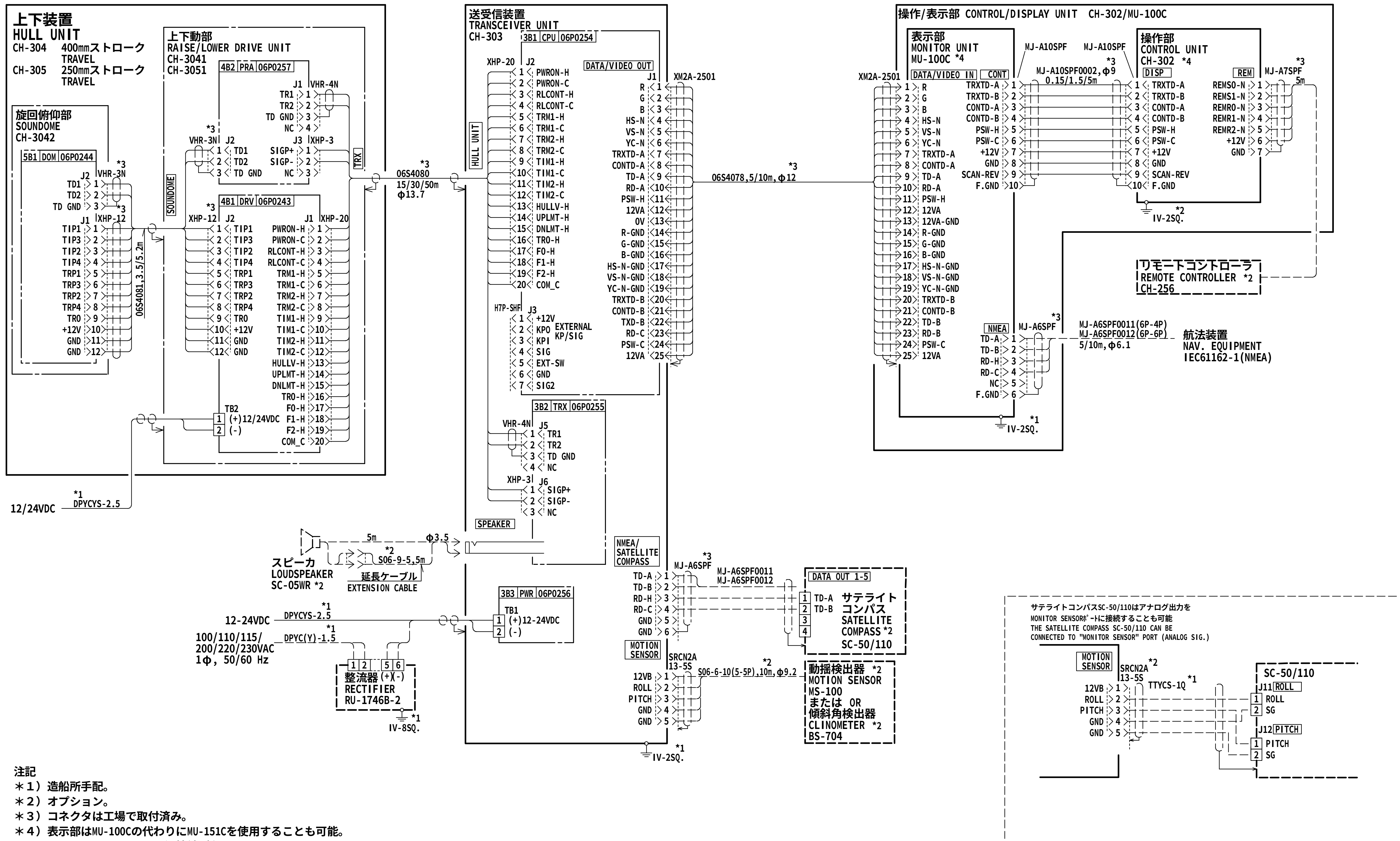
1. 装備法の決定に際しては、安全性(強度、水密性等)を重視し、保守・点検の容易さにも配慮すること。
   DECIDE AN INSTALLATION METHOD CONSIDERING SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE SHIP'S HULL. ALSO PROVIDE ENOUGH MAINTENANCE CLEARANCE.

DRAWN Mar.13'00 T.YAMASAKI		TITLE	CH-250/S
CHECKED Mar.14'00 Y.Kimura		名 称	格納タンク
APPROVED Mar.14'00 S.Yoshimura			送受波器装備図
SCALE 1/15	MASS - kg　単位 UNIT: mm	NAME	RETRUCTION TANK
DWG No. C1316-T01- A			TRANSDUCER INSTALLATION

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1 2 3 4 5 6		S-1



注記

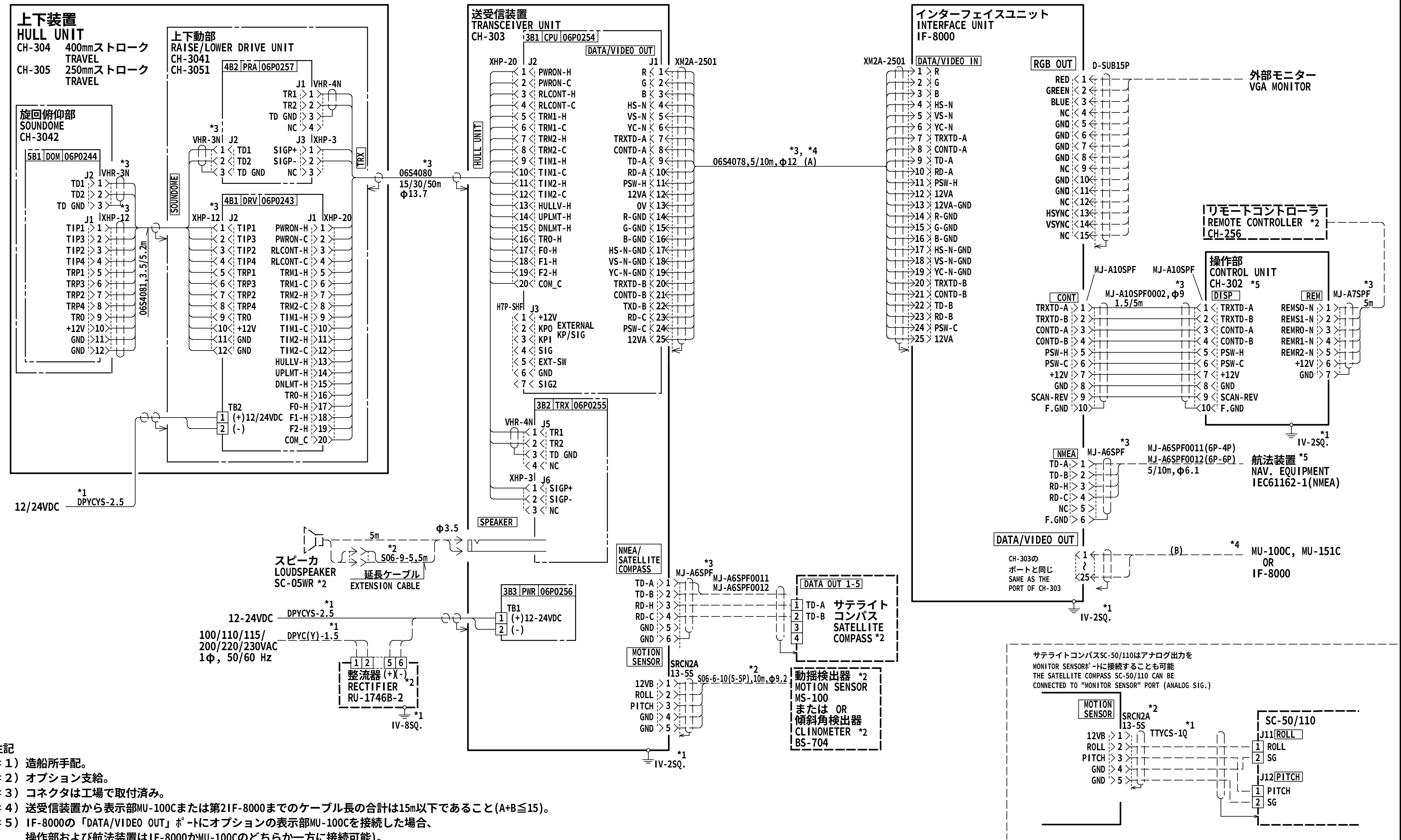
＊1）造船所手配。
＊2）オプション。
＊3）コネクタは工場で取付済み。
＊4）表示部はMU-100Cの代わりにMU-151Cを使用することも可能。
　　ただし、MU-151Cには電源接続が必要。

NOTE

*1. SHIPYARD SUPPLY.
*2. OPTION.
*3. CONNECTOR PLUG IS FITTED AT FACTORY.
*4. THE MONITOR UNIT MU-151C CAN BE USED INSTEAD OF MU-151C.
HOWEVER, THE MU-151C MUST BE POWERED FROM SHIP'S MAINS.

DRAWN Apr. 13, '05	E. MIYOSHI	TITLE	CH-300
CHECKED	TAKAHASHI.T	名称	2周波サーチライトソナー
APPROVED	Y. Hatai		相互結線図
SCALE	MASS kg	NAME	DUAL-FREQUENCY SEARCHLIGHT SONER
DWG No.	C1325-C01- A		INTERCONNECTION DIAGRAM

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注記

＊1）造船所手配。

＊2）オプション支給。

＊3）コネクタは工場で取付済み。

＊4）送受信装置から表示部MU-100Cまたは第2IF-8000までのケーブル長の合計は15m以下であること(A+B≦15)。

＊5）IF-8000の「DATA/VIDEO OUT」ポートにオプションの表示部MU-100Cを接続した場合、
操作部および航法装置はIF-8000かMU-100Cのどちらか一方に接続可能)。

NOTE

*1. SHIPYARD SUPPLY.

*2. OPTION.

*3. CONNECTOR PLUG IS FITTED AT FACTORY.

*4. CABLE LENGTH BETWEEN TRANSCEIVER AND MONITOR UNIT (MU-100C) OR 2ND I/F UNIT SHOULD BE 15 m OR LESS (A+B≦15).

*5. WHEN OPTIONAL MU-100C IS CONNECTED TO "DATA/VIDEO OUT" OF IF-8000, BOTH CONTROL UNIT AND NAVIGATIONAL EQUIPMENT CAN BE CONNECTED TO MU-100C OR IF-8000 UNIT.

DRAWN	Jun. 23, '05 E. MIYOSHI	TITLE	CH-300
CHECKED	TAKAHASHI.T	名 称	2周波サーチライトソナー(I/Fユニット使用)
APPROVED	Y. Hatai		相互結線図
SCALE	MASS kg	NAME	DUAL-FREQUENCY SEARCHLIGHT SONER (W/ I/F UNIT)
DWG No.	C1325-C02- B		INTERCONNECTION DIAGRAM